THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 583.] LONDON, JULY 14, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
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WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
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ERECTING AND REMODELLING
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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Presented by Her Majesty's Government to the French Government;
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IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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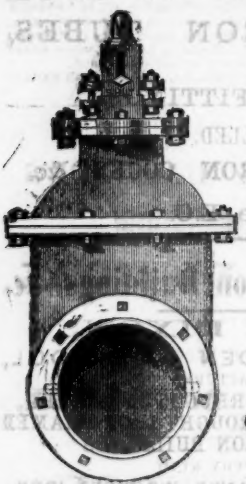
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

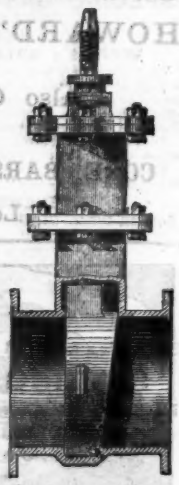
They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.



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PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.

WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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FOR GAS, STEAM, AND WATER;

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FOR GAS, STEAM, & WATER, EITHER BLACK, GALVANIZED, OR ENAMELLED.

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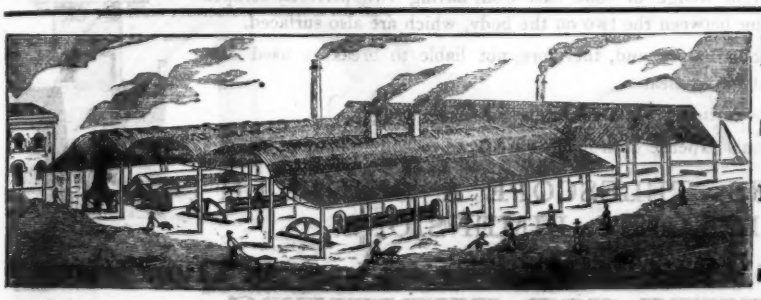

Iron Roofs, Iron Buildings, &c.

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GALVANIZED CORRUGATED CURVED IRON ROOFING, WROUGHT-IRON FRAMED ROOFING, IRON BUILDINGS

OF EVERY KIND.

WROUGHT-IRON TANKS, WROUGHT-IRON PIPES & TROUGHS, & GENERAL WROUGHT IRON WORK.

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IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

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Drawings and Prices upon application.

GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

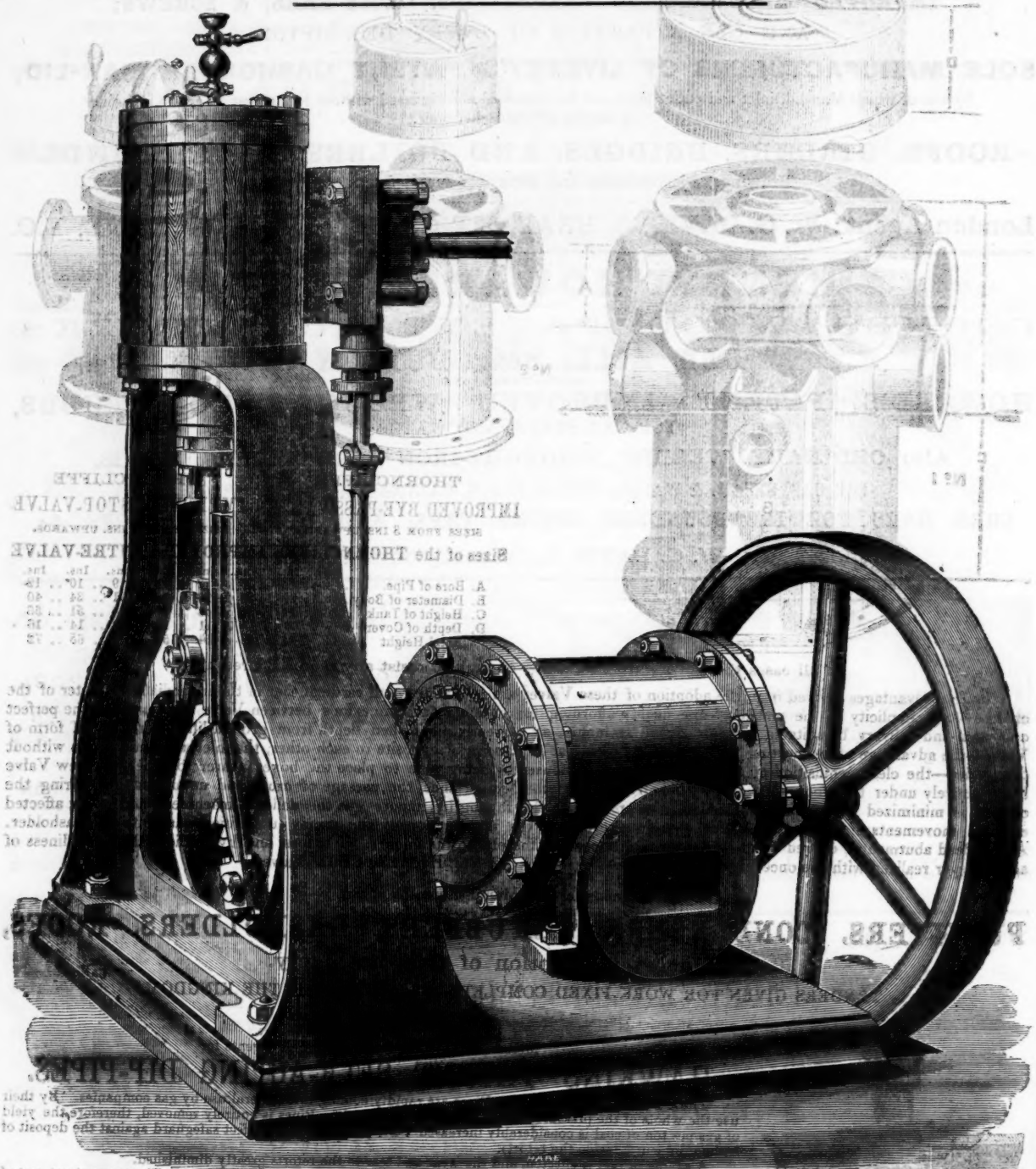
SOLE MAKERS OF

Beale's Improved

PATENT GAS-EXHAUSTERS AND COMBINED ENGINES,

ON ONE BASE PLATE.

NOTE.—The Exhausters are extra large for moderate speed.



This COMBINED VERTICAL ENGINE and EXHAUSTER was specially designed by G. Waller and Co. for small works, where space is an object, and is applicable for Exhausters from 1000 to 15,000 per hour. This is the *only* Engine and Exhauster **complete on one Base Plate,** requiring only one foundation.

Note.—They are sent away complete, and are easily fixed.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

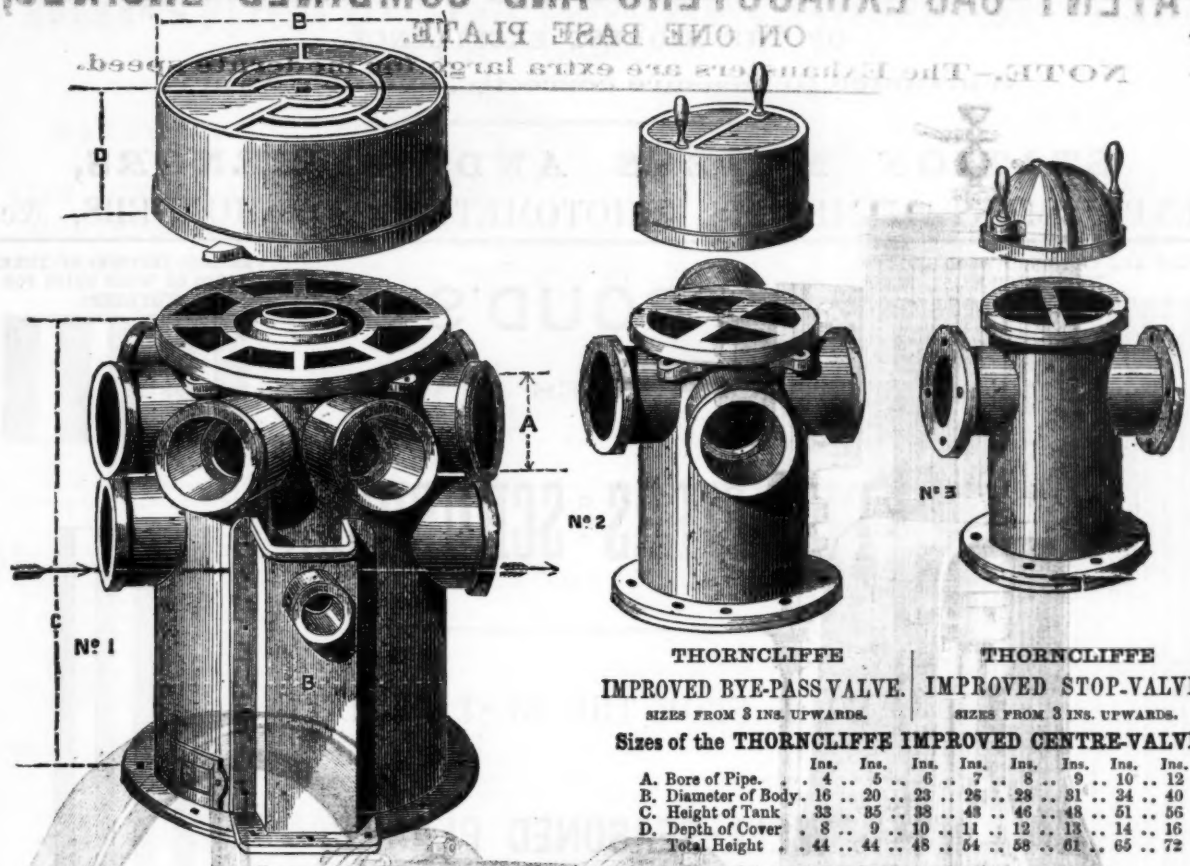
AND AT

STROUD, GLOUCESTERSHIRE.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

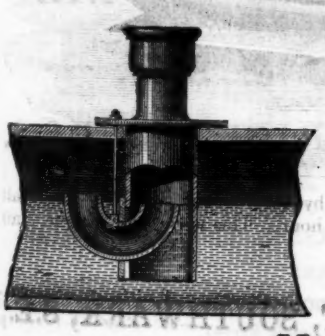
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

Messrs. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast Iron and Tin Cases,

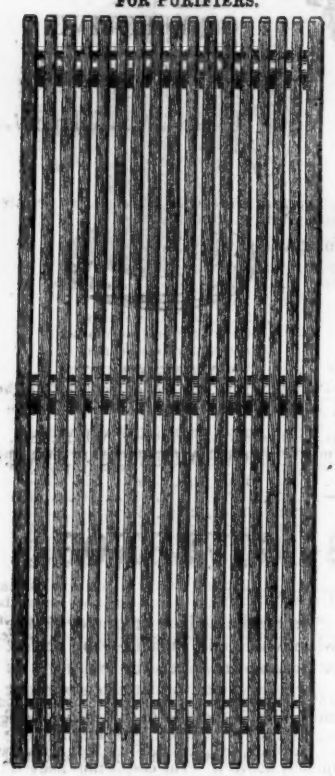
OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

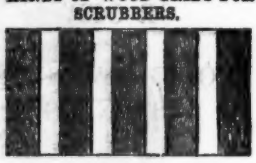
STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.

PLAN AND SECTION OF WOOD GRID, FOR PURIFIERS.



VERTICAL SECTIONS OF THREE KINDS OF WOOD GRIDS FOR SCRUBBERS.



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PURIFIERS AND SCRUBBERS

MADE FROM THE BEST QUALITY

OF

WELL-SEASONED PLANKS.

BROOKFIELD WORKS,

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MADE EITHER TAPER or PARALLEL
WITH SQUARE OR ROUND DISTANCE BLOCKS.

SCALE, ONE-FOURTH FULL SIZE.

Established

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JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

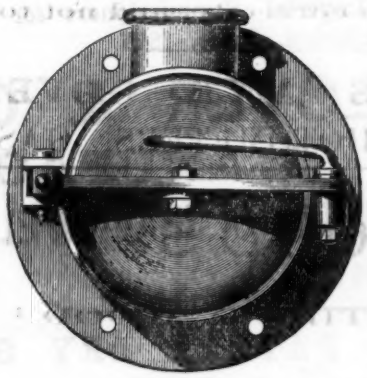
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

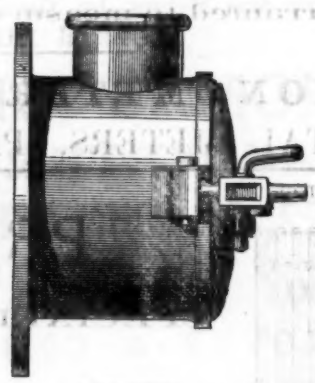
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydfl. Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

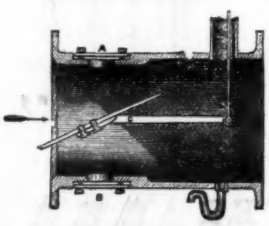
The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov.* 14. 1871.

"Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) "F. J. EVANS."

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

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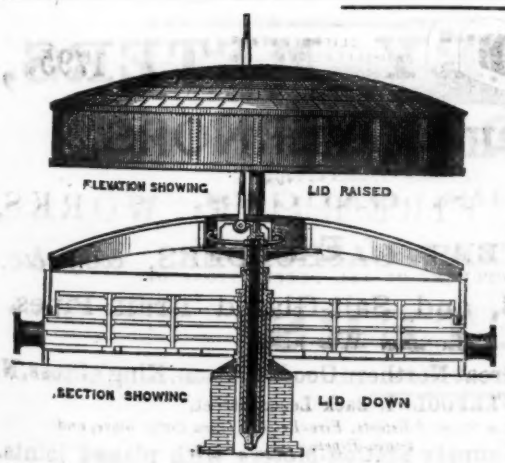
The Gaslight Company—a 24 in. at Whitechapel District Station.	The Gaslight Company—a 6 in. at the Gas-Works, Beckton.
" " a 36 in. at Goswell Road Station.	The London Gas Company—an 18 in. at the Gas-Works, Nine Elms.
" " a 24 in. at " "	" " an 8 in. at " "
" " a 24 in. at the Gas-Works, Beckton.	" " a 24 in. at " "

Also at the Gas-Works, Rochdale, Monmouth, Devonport, Cannes, and Mentone (France), &c.



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NOTICE TO SUBSCRIBERS.

Subscribers who desire to avail themselves of the reduction in the subscription to the JOURNAL by paying in advance for the second half of the year 1874, are reminded that this can only be done during the present month.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 14, 1874.

Circular to Gas Companies.

AT a recent meeting of the South London gas agitators—we do not use the term in an offensive sense, for the meeting was very respectably attended—an air of importance was given to the proceedings by the fact that a member of Parliament of much experience, and whose opinions are entitled to consideration, occupied the chair on the occasion. We never get notice of these gatherings, and, consequently, have to rely on second-hand information for what takes place at them; but, from what is reported, we do not see that the audience derived much consolation from Mr. Locke's attendance. He has served on several parliamentary committees in relation to metropolitan gas affairs, and, no doubt, like his colleagues, endeavoured to do the best he could for the gas consumers. But he could not have his own way exactly, and he seems to consider that the consumers have suffered in consequence. As, however, we are left in ignorance of what his ideas were, we are unable to judge what would have been the result of their adoption. The gas companies, he is made to say, "were too strong for "him;" or, as elsewhere, the advocate of the companies opposed to him at a conference suggested by Mr. Ayrton, "was more "skilled in the matter than he," and, therefore, he could not be surprised at being beaten. However, either in spite of Mr. Locke's opposition, or with his concurrence, the metropolitan gas companies find themselves in their present legal position. It will be found very difficult to change it, and Mr. Locke did all he could when he promised to bring the views of the meeting before Parliament. Unfortunately the meeting adopted a most impracticable notion, which we thought Sir Charles Adderley had exploded. It is, that the gas companies shall be superintended by a Government Commission, resembling the Railway Commission in name, but differing altogether in functions. The Gas Commissioners are to supervise the management and regulate prices—or, in plain English, three commissioners, appointed by the State, are to do the work of all the gas directors in London. Now, this could never work. Any one can see that, if such commissioners were appointed, they could simply endorse the statements and acts of directors, or, at most, now and then, as we have seen with other commissions, "split a difference." Practically, except under circumstances never likely to arise, they could exert no independent action. We have before counselled patience, and must repeat the advice. Whatever can be done to reduce the price of gas will be done by the spontaneous action of the companies, and a reduction can only be delayed by parliamentary interference. Another select committee may sit, and the companies may be put to an enormous expense to defend their interests, and who will pay for it all? The consumers! But leave the companies at peace to develop their business and improve their processes, and good will come which could never be obtained by parliamentary aid.

It is reported that negotiations are in progress for the purchase of the gas undertaking at Gravesend by the Corporation of the borough. The company have, we believe, a paid-up capital of £20,000, paying 5 per cent. The consideration for the purchase spoken of varies from £30,000 to £50,000. Something between the two sums would be a very fair price for the undertaking.

A curious case is reported at Bradford. The Corporation got a new consumer, and laid on the gas, putting, however, a meter with only two indexes, registering, it is said, only units and thousands. The mistake was presently discovered, and a new meter registering tens of thousands was put down; then the true consumption being ascertained, the Corporation sued the consumer for the quantity of gas calculated to have been consumed, *minus* an allowance of 20,000 feet and 5 per cent. off the amount supposed to be due. The sum demanded was £24 14s. 7d., and the consumer tendered £11 5s. 1d. in payment, which was refused. He was then summoned for the full amount, and after a noisy discussion, it is reported that the bench decided on splitting the difference in the two amounts, giving the consumer, however, the additional benefit of the 20,000 feet and the 5 per cent. discount, because they believed that the defendant had no culpable knowledge of the error. Splitting the difference is always an easy, if not an altogether satisfactory, way of settling a dispute.

The Exeter Town Council and the gas company have just now a difference which, we are happy to think, will be amicably settled. The company have recently laid a new main up one side of the High Street, to replace another which ran up the middle of the street. They now propose to remove the old main; but the council object to the disturbance of the roadway, which the surveyor asserts could not, if broken up, be brought again into its present excellent condition for many years. The objection is reasonable; but the company want the pipes, and, as they properly say, cannot forego their legal right to remove them. A very simple course has been suggested to the council, which we hope they will adopt. They can buy the pipes of the gas company and leave them as they lie, where, though empty of gas, they will serve a very useful purpose.

Arrangements seem now to be completed for the inauguration of the average meter indication system in Paddington. The vestry have advertised for contracts for the supply of the meters, including the cost of inspection and repairs. As this is the first instance of the adoption of the system within the metropolitan district, the result of the experiment will be looked forward to with interest. There can be no reason why it should not prove as satisfactory to the Imperial Gas Company as to the Paddington ratepayers.

We are able to-day to bring to a conclusion our reports of the papers read at the recent successful meeting of the British Association of Gas Managers. In the paper of Mr. Crookenden, our readers will recognize an idea which has been more than once brought forward in these columns. It is that gas companies should take an interest in—we will not say should assume control over—internal fittings. We do not wish to cast reflections on a very respectable body of tradesmen, but there is no shutting one's eyes to the fact that gas-fitters, as a rule, do not possess a scientific knowledge of their business, or, if they do, seldom exercise it. They keep the prettiest gaseliers, according to their taste, and they buy nipples by the gross without regard to their quality. The customer selects his chandelier, and the fitter puts on the nipples just as they come. To ensure a proper supply and an effective consumption of gas, two things have especially to be attended to—the size of the distributing-pipes and the nature of the burners. The choice of these is usually left to be determined by accident and the gas-fitter. Our idea is that the gas company may very properly step in as adviser, and say to a consumer, "You require so many lights. You must have such and such "sized pipes, and the burner we recommend you to use is ——." We do not care to announce a preference. In this case no re-

sponsibility would be assumed; the "skilled gas-fitter" employed by the company would be simply an adviser, and, we believe, his engagement would be profitable to a company.

The method pursued by Mr. G. D. Malam to retain naphthaline in a state of vapour has the merit of being very simple and easy to practise, but it costs money. Mr. Watson's plan has many recommendations, but does not seem so completely successful. We agree with him that naphthaline ought not to be regarded as an impurity. It is highly desirable to keep it in the gas in a state of vapour, but gas will only carry a certain undetermined amount. For this reason it is best, as far as possible, to avoid its formation.

Mr. A. Malam's new process for manufacturing cannel gas well deserves more consideration if it can be shown to be applicable to the manufacture of common. From the one experiment with Newcastle coal, which gave 13,400 feet per ton, it would seem that it may be applied with great advantage. The process looks like Dr. Eveleigh's, conducted in one retort. We hope that further experiments will be made with common coal, and that all doubts respecting the accuracy of the station-meter will be set at rest.

The accounts of the metropolitan gas companies for 1873 have been laid before Parliament, and we shall at the earliest possible date, probably in our next issue, publish our usual abstract.

On the first of the current month the supply of cannel gas was discontinued in the late Western Company's district, and replaced by the Chartered Company's ordinary gas, of about 17-candle illuminating power. We have it on the best scientific authority that no difference in the light was discernible by the eye. The change will, no doubt, cause great satisfaction from the lower price charged, if for no other reason.

Water and Sanitary Notes.

THE Wakefield Water Bill has now been before a committee of the House of Lords for more than a fortnight, and the inquiry still drags its slow length along, at a cost, it is said, of 1000 guineas a day. Much new evidence has been produced, but only in confirmation or contradiction of that given before the Commons committee. When the proceedings have closed we shall give an abstract of such portions of the evidence as require notice after our full report of the case when in the Lower House.

The Tynemouth Town Council, as we mentioned some weeks ago, are much dissatisfied with the supply of the North Shields Water Company, and have resolved to enter into negotiations with the company for the purchase of the undertaking by arbitration. With the prospect of competition with the Newcastle Company, if they succeed with their proposed Bill next year, the North Shields Company probably will not be disinclined to sell their undertaking to the Tynemouth Corporation.

The "Moorfoot" Bill, as it is called, of the Edinburgh and District Water Trustees has passed the House of Lords, and now only waits the Royal Assent. The trustees naturally congratulate themselves on their success—achieved, it seems, at comparatively little expense. During the drought the water supply to Edinburgh and the districts has been well maintained, averaging 29 gallons per head per day.

The circular of the Local Government Board published in our last is already creating a stir among the sanitary authorities about the country, and week by week we shall no doubt receive intelligence of more and more agitation respecting water. Under such circumstances it behoves water companies to exercise the greatest vigilance to ensure the purest, and to exert themselves to give the largest, possible supply. One of the first local authorities to discuss the matter is the Town Council of Longton. The potter, working in a dusty, and living in a smoky atmosphere, requires a good deal of water to slake his thirst and perform his ablutions. But the Longton supply is alleged to be deficient in quantity, and of decidedly inferior quality. If this be true, the council are to be commended for taking the matter in hand. It is only fair to say that one member of the council stated that the quality of the water had improved within the last few days. We hope that the improved condition will be maintained, and that we shall hear of no more complaints. Tipton and Darlaston, in the Black Country, are no better off. They appear to be in part supplied by the South Staffordshire Water-Works Company; but the supply seems to be limited, and the poor have to depend on shallow wells, the water in which is greatly contaminated. Last month the mortality in Darlaston was over 41 per 1000, many of the deaths being ascribed to preventible causes. At Tipton, Dr. Ballard, the Government Inspector, strongly urged upon the Local Board the duty of supplying the people with sufficient wholesome water. We say it with great regret, but it must be said, that the shortcomings of water companies, and the supineness of local authorities, are tending to bring about the close central supervision which we all deprecate, but which must result unless vigorous action be taken in the present emergency.

Another "water famine" is reported in Bermondsey, which we hoped would never have occurred. It seems, however, that unexpected difficulties have been met with in the completion of the reservoir at Nunhead. Still it seems very extraordinary, if it be true, that a district in this metropolis, small though it be, should have been without water for several days.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXI.

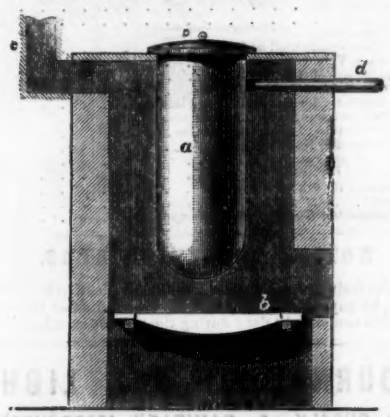
RETORTS.

The history of any particular branch of science or art, describing the various errors committed in its progress towards comparative or positive perfection—if, indeed, this is ever attained—must tend to instruct and guide those immediately interested therein, and with this view we intend to present the progressive steps of some of the most important subjects connected with gas lighting under their different heads.

In describing the first operations in the manufacture of gas and in the retorts employed, we cannot do better than refer to the writings of Creighton,* the intimate friend of Murdoch, and who during several years assisted him in his numerous and varied experiments on gas lighting. These two gentlemen, together with Clegg, were engaged contemporaneously at the Soho Works, where, as before stated, gas lighting was first practically applied.

According to the author mentioned, "the retort first employed by Murdoch was of cast iron, and of a cylindrical form, as shown at fig. 1; *a* is the retort with its cover, *b* the furnace, *c* the chimney

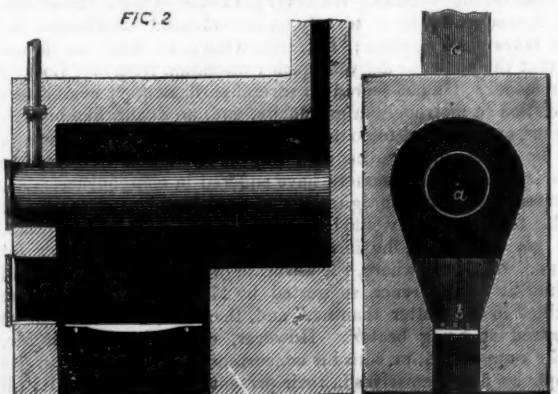
FIG 1.



d the pipe for conveying away the products of distillation. This being about two-thirds filled with coal, was submitted to the action of the fire, and on its acquiring a red heat, the decomposition of the coal commenced, the tar, oil, and gaseous products escaping through the pipe *d*, and the charcoal or coke remaining behind in the retort." This, as well as the retorts shown in figs. 3 and 4, were each made so as to contain about 15 lbs. of coal, and were no doubt simply for the purpose of experiment.

"It is obvious that this form of retort was inconvenient, as regards the removal of the coke at the termination of each process; and to remedy such inconvenience a different construction was adopted, which we saw as early as the year 1802. Of this a representation is given in fig. 2" (one being a longitudinal view, the other a cross

FIG. 2



section within the wall front); "*a* is the retort, consisting of a cylindrical vessel, placed horizontally, provided with a door or cover, to charge and discharge it of its contents. The various letters of refer-

* "Gaslights." Supplement to "Encyclopædia Britannica." 1824. By H. Creighton.

ence apply to the same parts indicated in fig. 1. The flues were so constructed that the flame surrounded the retort, and afterwards made its escape at the chimney. Retorts on this construction, from 12 to 20 inches in diameter, and from 3 to 7 feet in length, were found to answer tolerably well, and could be charged and discharged with facility."

In the paper transmitted to the Society of Arts by Mr. Clegg, in 1809, describing the application of coal gas to useful purposes, a similar retort, set like that mentioned, is represented, but it is protected from the immediate action of the fire by an interposed curved plate of iron.

Here we may observe that it frequently happens in our endeavours to make improvements, our plans for that purpose have directly an opposite tendency. This was particularly the case with Murdoch at this period and for some time afterwards, for, instead of advancing in the mode of constructing and setting retorts, the very reverse was the case; but, as will be seen hereafter, these errors conveyed excellent experience and lessons with them.

Again quoting the words of our author, "figs. 3 and 4 represent

FIG. 3

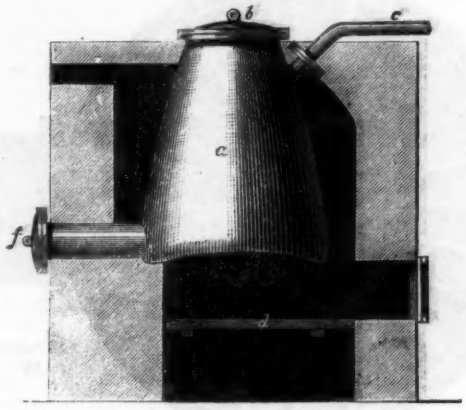
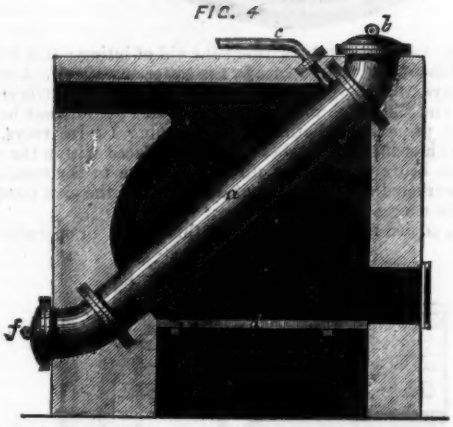


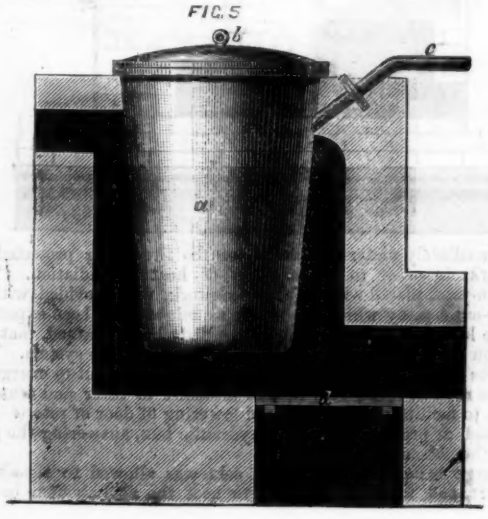
FIG. 4



other variations which we observed in use in the years 1804 and 1805. The peculiarity of these consists in their having each two doors or openings, *b* and *f*—the first to admit the coal, and the other to allow of the discharge of the coke; *a* is the retort, *c* the pipe for conveying away the gas, the rest needs no explanation."

"These retorts were necessarily more costly than those having only one opening, and they were, on the whole, found more troublesome to manage and keep in order.

FIG. 5

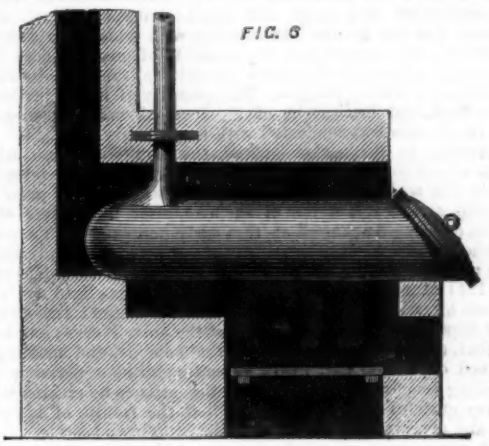


"Fig. 5 is a representation of one of the retorts first used at the works of Messrs. Lee and Phillips, which differs little from fig. 1, except in magnitude, this being made to contain about 15 cwt. of coal." (The vessel must have been nearly 4 feet in diameter, and of rather greater depth.) "The grates, flues, chimney, and general construction require no particular description, the letters indicating the various parts corresponding with those already named. In order to facilitate the discharge of the coke, an iron cage, formed somewhat like a grappler, was let down into the retort previous to its being charged with coal; and, when the process of distillation was completed, the grappler was lifted out by means of a small crane, carrying the mass of coke with it. Another cage being then introduced, a fresh charge of coal was then thrown in, and the process of distillation was carried on with very little interruption." And this may be regarded as the first attempt at mechanical stoking.

"It is sufficiently obvious, from the construction of this retort, that upon it being charged with fresh coal, and already of a white heat, the process of carbonization will proceed most rapidly at first; but a crust of coke being speedily formed next to the heated metal, and this continually increasing in thickness, prevents the free transmission of the heat, and the decomposition of the coal is retarded more and more as the crust increases in thickness.

"As a remedy for this evil, and to which all the above-mentioned retorts are liable, unless made of extremely small capacity, and thereby unfitted for practical use, an oval form was tried similar to fig. 6; and generally it was observed that when keeping this shaped

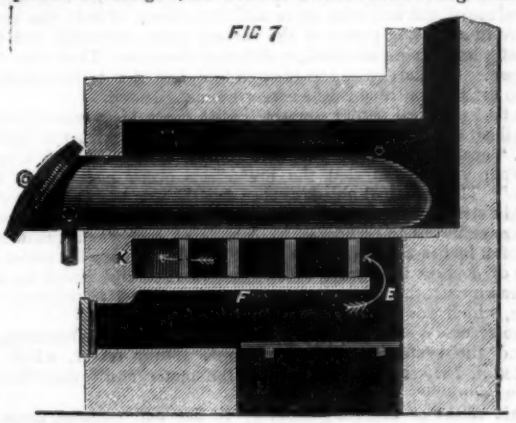
FIG. 6



retort at a bright red heat, and introducing the coal into it, when in that state the quantity of gas was increased from one-third to one-half (compared with what the retorts, fig. 5, yielded), the time of distillation greatly shortened, and the quality of the gas much improved.

"The degree of heat, however, which was found to be advantageous for the production of gas was very destructive to the cast iron of which the retorts were formed, and, to preserve these from rapid oxidation, their lower sides were made to rest upon thin fire-bricks, as represented on fig. 7, the section of the retort being somewhat

FIG 7

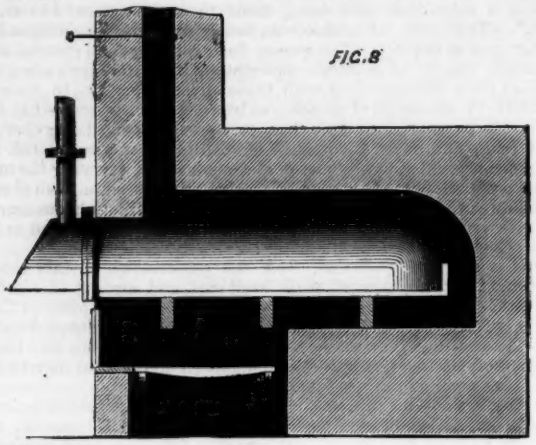


varied from the oval (kidney-shaped) where the under side of the retort is curved upwards, so as to apply with greater exactness to the surface of the protecting bricks, which are supported by other bricks set on end, and standing on an arch, F, over the fire-place; the flame, rising through the opening, E, passes in the direction of arrows, and escapes through two side flues, one of which is shown at K, and after rising and passing over the top of the retort, enters the chimney. The pipe for conveying away the gas was placed at the side of the mouthpiece, and descended as represented.

"A somewhat similar form is shown on fig. 8, ⌂. The flame from the fire, after acting against the fire-bricks, divides and escapes through the flues, and after uniting again in the upper side of retort, ascends to the chimney. Each retort was made to contain about 1 cwt. of coal, when somewhat more than half filled, and produce gas at the average rate of about 100 to 150 feet per hour, according to the nature of the coal employed." In this drawing a damper is

shown, the importance of which was not appreciated for many years afterwards.

FIG. 8



"The results of a great number of experiments continued for a length of time, and under the varying circumstances of rapid and slow distillation and large and small charges of coal, showed decisively that the greater the rapidity with which the distillation was effected, the greater was the quantity of gas produced from a given weight of coal, and (volume for volume) the more intense the illuminating power of the gas. The quantity of liquid product was also lessened, and the weight of the residual coke not so great as when the process was conducted with less rapidity."

According to the author quoted, the results of these trials of various retorts were ascertained, and much other valuable information in connexion with the manufacture of gas was acquired prior to the year 1810, and it is a matter of surprise, after the degree of comparative excellence achieved at that early period, that so much difficulty should have been subsequently experienced in the advancement of the mode of setting retorts. But it must be remembered that about 1811 Murdoch ceased to apply himself to gas lighting, in order to devote himself to the construction of steam-engines, then becoming a very important branch of industry at the Soho Works; and we may infer that, after having established the new art, and meeting with continued opposition and heavy expenses, without deriving a corresponding benefit therefrom, he left that science he created without any very grateful remembrances, so that the results of his experiments and observations may be considered to have been lost.

With our present knowledge of the subject, we are almost disposed to smile at some of the expedients, such as have been described, resorted to by Murdoch, in the setting of retorts; but the errors he committed were speedily rectified, so that, step by step, he progressed, until he produced the setting described at fig. 8, which can be favourably compared with those of a similar capacity of the present day. This is the more remarkable on account of the many difficulties subsequently experienced, during several years, before any degree of excellence in that branch of gas manufacture was attained.

But it was not alone to retorts that Murdoch's great abilities were directed, for in the course of his investigations he ascertained the produce of gas and coke from different kinds of coal, the comparative illuminating power of the various gases obtained, and the value of these when consumed in different burners. Therefore, too great praise can hardly be awarded to him, and it is to be regretted that he did not continue in the career he inaugurated.

The first practical patent connected with our subject was obtained by Maiben, of Perth, in 1810, who proposed to construct a square retort, "nearly resembling the folio volume of a book, with a cast-iron vent upon it, so that the fire affects every part except the mouth." The principal object of the patentee was to expose the coal in a thin stratum. "For this purpose the retorts were made each of a size sufficient to carbonize 25 pounds of coal when spread in a layer of 2 inches thick, the coal being introduced into the retort by means of a sheet-iron tray, which was charged and slided in, and withdrawn with the coke whenever the gas was extracted from the charge, which was generally accomplished in two hours."

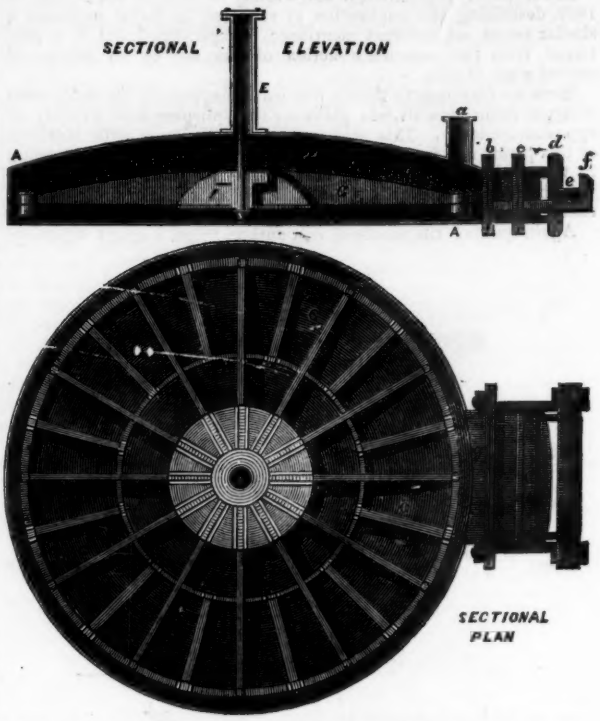
Some success seems to have attended this mode of carbonizing, as we find the system applied to Clegg's rotary retort, which he patented in 1815 in conjunction with the meter, and is described as follows:—

"This retort or distilling-chamber is flat and circular, made of metal plates, of about 12 feet in diameter, and placed horizontally. It is fitted up with a perpendicular shaft, to which are attached radiating arms, all being enclosed within an oven of a capacity just sufficient to allow the arms, boxes, and contents to revolve freely. The fire or furnace is placed at one side of the circumference of the oven, so that one part of the retort is heated more than another."

The coals are placed in shallow boxes, which glide on to the radial arms. A slow motion being given to the shaft, the different boxes and their contents are gradually turned round, where there is suitable provision for taking out the boxes containing the coke, and replacing others filled with fresh coal, ready to be carried round to the heated side where the gas is generated.

Fig. 9 is a perpendicular section of the retort. The first, constructed for the Royal Mint of London, was 8 feet 6 inches in diameter, made of wrought-iron plates about half an inch thick. Within the outer case, A A, which may be properly called the retort, was a vertical shaft revolving in a cup at bottom, and having at its base a boss, F, having radiating blades keyed on to it. Attached to these blades were twelve radiating horizontal arms, G G, to which were fixed the outer and inner concentric rings; *a* was the pipe for conveying away the gas and vapours, *b* the flange of retort, *c* the flange of mouthpiece. Fig. 10 is a plan of the same, the door, C, being

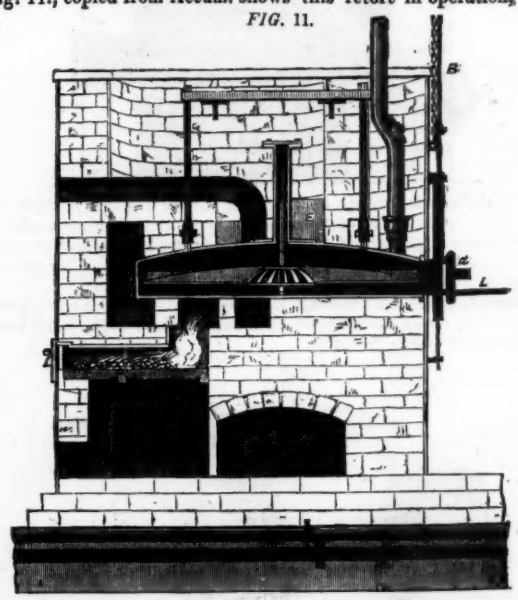
FIGS. 9 *and* 10.



fitted so as to be air tight without the aid of luting; this was also counterbalanced, and made secure by the cotter or wedge *d*. A series of shallow trays, their length being from one of the concentric rings to the other, and the width of each being enclosed by the space between two of the principal radiating arms, forming twelve trays, were charged with coal about 2 inches thick, and placed within the retort, the furnace being at the part directly opposite to the mouthpiece, and so constructed as to heat about one-third of the area comprised between the concentric rings.

Fig. 11., copied from Accum. shows this retort in operation, that

FIG. 11.



part immediately under the action of the fire being protected by brickwork, in order to prevent loss of heat by radiation. The ascension-pipe, placed without the brickwork, was provided with a clearing-out cap, by which we learn, as might have been expected, from the low heat the retort must necessarily have attained, that the formation of pitch was one of the annoyances of the system. The chain was for opening the hydraulic valve when about to charge or draw the retorts. The rod, B, was attached to lever and counterbalance, to facilitate the raising and lowering of door of retort. The gas passed, as produced, into an hydraulic box, answering the purpose of the present dip-pipe.

A charge being carbonized, the coke was allowed to remain in the retort, and, in cooling, tended to heat the coal about to be car-

bonized, which was stated to be one of the advantages of the process. "When necessary to change, the workman moved the retort by pulling towards him with an iron hook the nearest iron arm opposite the door."

Accum, when enumerating the advantages of the system, enters into most extravagant statements of the economy of labour, fuel, and the marvellous quantity of coke and gas obtained from coal according to the process.

Peckstone, writing in 1819, expressed his great admiration of these retorts, and said: "The first of them which was ever put up (being 8 feet 6 inches in diameter), as well as the second and third (each 12 feet 6 inches in diameter), were worked under my observation. Each of these retorts contained 15 boxes, which slided into the retorts upon iron arms, and whilst the arms were kept up they worked without much difficulty, the coal remaining in the retort six hours, but was only one-third of that time exposed to the action of a red heat. Five boxes having passed the furnace, their contents being carbonized, waited until the coal in other five boxes over the red heat was decomposed, which being done, the retort was opened, and those five boxes which had passed the red heat were drawn, and fresh ones introduced upon the arms they had occupied; so that there were continually five boxes newly introduced into the retort, waiting to be brought over the red heat, five over the red heat, and five others, containing coke, ready to be withdrawn from the retort."

"Had not the expense of erecting retorts of this description been considerable, and the wear and tear enormous, they would doubtless have been adopted in that establishment where they were first tried, but both were so much against them that every idea of using them was there entirely relinquished." He continues: "It is but justice to say that those retorts produced gas at the rate of upwards of 15,000 cubic feet per chaldron" (27 cwt.) "of coal;" (by the ordinary methods from 8000 to 10,000 feet were then obtained), "that carbonization was carried on at about 16 or 18 per cent., that the increase of coke from coal carbonized was at the rate of 50 per cent., and the process of carbonizing was accomplished in about six hours," in all of which statements he corroborated Accum, although the assertions of the latter were still more wonderful.

It is surprising how our authors could have fallen into such extraordinary errors, for experience since then has fully established the inaccuracy of their statements, inasmuch as by the nature of the construction of the apparatus the coal must of necessity have been distilled at a low temperature, and in consequence the yield of gas have been small, whilst the asserted increase of coke could only apply to its bulk; but, as its nature would in consequence be very friable, this would be highly objectionable, both for stacking and the general purposes of fuel. Therefore, instead of the system possessing advantages, it must have been highly prejudicial.

Communicated Article.

HEATING GAS TO REMOVE BISULPHIDE OF CARBON.

By WILLIAM MANN, Gas-Works, Blackfriars, London.

When the Rev. Mr. Bowditch (about 1860) proposed to pass gas, that had been purified in the ordinary way, through hot lime, for the purpose of breaking up the bisulphide of carbon into sulphuretted hydrogen and carbonic acid, he evidently entertained the idea that *hot lime* had something chemically to do with the result. He says: "The substances (charcoal and sulphur) unite [in the proportion of 6 lbs. of carbon and 32 lbs. of sulphur" . . . "Now, suppose the 32 lbs. of sulphur were united to 2 lbs. of hydrogen, instead of 6 lbs. of carbon, in that case there would be no difficulty in removing the sulphuretted hydrogen thus formed, and the cost of its removal is not worth naming. The problem has been the substitution of hydrogen for carbon, and I have this morning the pleasure of showing you its solution. I have here a tube containing slaked lime, which has been dried so as to remove all water except that necessary for a hydrate. The lime is heated by this gas-furnace to about 400° Fahr., and now a current of hydrogen and bisulphide of carbon shall be sent through the tube and over lead paper placed at the entrance and exit. The lead paper at the entrance of the hot tube is perfectly clean, showing that no sulphuretted hydrogen enters it; but the paper at the exit is blackened, showing that sulphuretted hydrogen leaves it, formed, of course, by a re-arrangement of the elements in the hot tube under the influence of the lime" . . . . "If we now pass coal gas over the hot lime, instead of the bisulphuret of carbon and hydrogen which were passed over it in the last experiment, we shall have the same result —viz., a liberation of the sulphur in combination with hydrogen, of carbon united to oxygen, forming carbonic acid, and a deposition of carbon blackening the lime."

Now, it appears to me that the lime was only necessary as an agent of division to facilitate the heating of the gas; the water combined with the lime supplying the hydrogen, which takes the place of the carbon in the decomposition of the bisulphide, and also the oxygen required to combine with the liberated carbon to form carbonic acid. It is correct to say that each molecule of CS_2 breaks up into two of SH_2 and one of CO_2, hence the necessity for the presence of water.

Since the experiments of Mr. Bowditch, the effect of heating the gas has been tried, and the same decomposition or rearrangement of the elements present effected without the presence of lime in any form; the vapour of water, always present in the gas (unless artificially dried) supplying the hydrogen and oxygen. In fact, you cannot heat gas at all without, to some extent, bringing about this decomposition. Consequently it has been proposed to pass all the gas, after purification from ammonia, sulphuretted hydrogen, and carbonic acid, through a heater, hot enough to raise it, say, to 300° Fahr., and thereby convert the bisulphide of carbon into sulphuretted hydrogen and carbonic acid—impurities easily removed by the ordinary purifying agents (lime and oxide of iron)—and the gas rendered more pure than by any ordinary method.

Assuming this statement to be correct, the heating of the gas is the next consideration. This, we are told, can be done, and is to be carried out on a scale that will put this interesting subject beyond mere writing and talking. Supposing the heating and cooling the gas to be accomplished by the means proposed, and the results such as to justify the expense of doing it, an all-important end will have been gained. But I think by heating a part of the gas the same purifying advantages before mentioned can be brought about, and the process rendered more popular, because less trouble and expense will be involved. I have by experiments proved that if gas purified from sulphuretted hydrogen and carbonic acid be again "fouled" with SH_2, and then passed through hydrate of lime, the sulphuretted hydrogen of course being in excess of the equivalent, so as to keep the sulphuretting of the lime a little in advance, the bisulphide of carbon is there and then removed.

Now, supposing we have a "heater" in connexion with an apparatus capable of producing gas at the rate of 3000 feet per hour, and the gas purified in the ordinary way from all impurities except the bisulphide of carbon; and, after leaving the purifiers, say one-third is passed through the "heater," while the other two-thirds are taking a bye-pass route, but joining the hot gas previous to the subsequent cooling of the whole, which will now have acquired an average temperature, or, if preferred, cool the heated gas before joining the unheated, prior to the total volume entering the lime where the final purification is to take place. I do not think that the carbonic acid formed by decomposing the bisulphide need be taken to interfere much with the sulphuretting of the lime, as SH_2 comes out double the volume of the CO_2, but if found in the way it can be dealt with accordingly.

My reason for allowing the hot gas to join the cool and produce an average temperature of the whole, and then reducing the total volume to the temperature of about 60° Fahr. before entering the lime, is that the hot gas may have the opportunity of decomposing some of the bisulphide that exists in the before unheated volume at the moment of their junction. But to this I do not attach much importance. The heated gas can be cooled alone, if found to be more convenient. Again, suppose it to be more suitable to make all the lime of one or more purifiers into sulphide of calcium before using it as a bisulphide purifier, we should proceed thus:—Heat (say) one-third, or at any rate as much gas as will give the amount of sulphuretted hydrogen necessary for the formation of as much CaS as required for the purification of the remaining unheated gas from bisulphide of carbon, and during this time let the unheated gas pass through sulphide of calcium that had been previously formed in a similar manner, and so on continually—heating the gas to form sulphuretted hydrogen, and then using it to produce the sulphide of calcium required to remove the bisulphide of carbon contained in the other volumes of the gas not heated. I am aware that I shall be met with the question, "How are you going to heat such a volume of gas as is made at some of the large works?" Well, with that I have nothing to do. There are those who think that *all* the gas made at any works can be easily heated enough for the purpose under consideration, and are preparing to do it. I am simply throwing out a hint that the bisulphide of carbon purification can be easier, if not better, done by only heating a portion, or about *one-third* of the *whole*. In either case lime must be used in the first purification to remove the normal volume of carbonic acid, for, as the decomposition by heat of the bisulphide of carbon vapour forms carbonic acid, it would not be well to leave any in and add to it. Again, only heating (say) one-third of the gas, so much less carbonic acid in proportion would be found, than if all, or three-thirds, were heated, so as to be of any practical value in this process of purification from sulphur.

As soon asready, by your permission, I propose giving an account of my sulphide of ammonium process, by which the purification of gas from ammonia, and the bisulphide of carbon, can be entirely effected by scrubbers in a perfectly continuous manner, and by which the lime used for the removal of the sulphuretted hydrogen and carbonic acid can be thoroughly carbonated and rendered innocuous before its removal from the purifying vessels in which it has been used for that purpose.

GIROUD'S RHEOMTER.

(FROM OUR PARIS CORRESPONDENT.)

M. Jamin has recently presented to the Academy of Sciences an account of a rheometer, invented by M. Giroud, which is a new regulator of gas that has been experimented on for two years in the gas-lamps of Paris, and the use of which it is proposed to extend throughout France and in foreign countries.

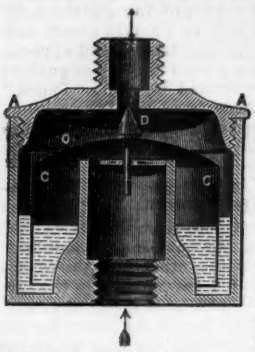
The rheometer, of which an engraving and a description follow, serves to regulate the current of gas intended for the supply of one burner.

When a burner placed on a supply-pipe is opened, an escape of gas is allowed, the constancy of which as regards volume depends on two principal data—the section of the orifice of escape, and the pressure acting on that orifice.

In order, then, to ensure constancy of delivery, a uniform pressure must act on an invariable orifice. It is not enough to make the pressure uniform at the burner, for then the size of the orifice remains one of the elements in the measurement, and on changing the burner you alter the expenditure of gas. Nor would it suffice to

depend alone on burners having rigorously equal orifices (if we might dream of getting such things), for then variations of pressure would cause changes in the delivery. The regulating apparatus in this special case must, therefore, fulfil the two conditions above named together; in other words, it must at the same time determine the pressure, and keep constant the size of the orifice of escape. In that case the regulator controls the volume of gas, and the burner is left to play its proper part, which consists in fixing the conditions under which the combustion of the gas takes place at the moment of its mixture with atmospheric air.

Giroud's rheometer is composed of a small cylinder of 3½ centimètres (1·38 inch) in diameter, and of an equal height, carrying a small cover, A A, above which is the jet. In the interior of the cylinder a metallic bell, C C, pierced with an orifice, O, moves in connexion with a cone, D, situated at its summit, which has in working the result of more or less closing the orifice of the small cover, A A. The apparatus is filled with glycerine to the height of about one centimètre (0·3937 inch).



The operation of the instrument is very simple. As soon as it is started the gas enters under the bell, and, lifting it, escapes at the same time by the opening with which it is pierced. From this moment the pressure is established above the bell, and the cone acts by changing the orifice according to variations of the pressure. Whatever such variations may be, they are equalized, both above and below the bell, in such a manner that its orifice in respect to gauge delivers the gas at a constant pressure, according to their difference, which is that due to its own weight.

The following establishes the theory of this rheometer:

Let P equal the pressure of the gas below the bell.
„ P′ „ the pressure above the bell.
„ R „ the weight of the bell; and
„ S „ the horizontal section.

Then, the bell being *in equilibrio*, the force due to a pressure below becomes evidently equal to that above, increased by the weight of the bell. Hence the equation:

$$P\,S = P'\,S + R$$
$$P\,S - P'\,S = R, \text{ and}$$
$$P - P' = \frac{R}{S}$$

The difference of the two pressures above and below the bell is therefore constant; consequently, the volume delivered by the orifice O is also constant.

It appears, therefore, that the cone rises with increase of pressure in such a manner that it delivers to the jet the 140-litres (say 5 cubic feet) measure by the gauge-hole of the bell for the rheometer regulating the normal consumption of the lamps illuminating the city of Paris.

This description shows the essential points of difference between this rheometer and the dry regulator of pressure invented by Mr. Sugg. In the latter the bell is replaced by a membrane of supple leather, which moves freely in the air, and which bears at its centre a cone regulating the arrival of the gas under the membrane in such a manner that the pressure there remains constant. The theory of the apparatus is analogous to that of the rheometer, but a cause of error can be perceived, due to the introduction of a variable force, which is that of the tension of the membrane, while this is *nil* in the bell of the rheometer.

The difference that is essential between these two forms of apparatus is as follows:—The Giroud rheometer delivers a constant volume of gas under all pressures, while the dry regulator gives a sensibly constant pressure at the jet. Consequently, the rheometer gives a constant volume of gas at all the burners to which it is adapted, the delivery is independent of the orifice; while with the dry regulator the delivery varies according to the burner employed.

The rheometer, being made entirely of metal, offers more security than the dry regulator, the membrane of which is apt to dry up and cease to act after a time. Different makers of Sugg's regulators have, however, remedied some of the defects of his arrangement. Experience, however, has proved sufficient to show the excellence of Giroud's rheometers.

In April, 1872, there were 115 of these arrangements adopted in the public gas-lamps of the city of Paris. Of these, 50 were in the Champs Elysées, and 65 in the Rue Lafayette and its neighbourhood. These rheometers are still in use; but during a recent period they have been removed, alternately, for experiment in the laboratory, each having been submitted to three trials in respect to variable pressures; and the resulting tabular statements, which we have before us, show that it is impossible to approach more nearly the normal type of 140 litres. The few variations which occur seem attributable to differences in the density of the gas. The experimental trials in the laboratory were also intended to determine the condition of the bell, and of the glycerine. An opinion had been expressed that the metal of the bell would decay in course of time, and that either perforations or an enlargement of the measuring-holes would result, by which the exactitude of the apparatus would be affected; but, on the contrary, the bells remain in a perfect condition. During the two years experiment, the condition of the glycerine remained unaltered, its fluidity having remained unchanged.

It does not appear necessary here to enlarge on the practical advantages of the rheometers, advantages such as an exact measurement and uniformity of combustion; simplification of lighting and inspecting duties, &c. But another result of the introduction of them has been the prevention of the stopcocks being impeded by the deposition of naphthaline, for the apparatus permitted them to be kept fully opened. Fifteen lanterns, furnished with rheometers, placed on the right-hand side of the Rue Lafayette, were not thus impeded during a period of two years, while the jets without such regulators, placed on the opposite side, were stopped on each change of temperature. These evident advantages of Giroud's rheometers tends to their general use on the Continent. They have been adopted at Rheims, Rouen, Lyons, St. Etienne, Genoa, Madrid, &c.

PUBLIC LIGHTING IN PARIS.

The examination of the public lamps of the city of Paris will lead to an improvement which is shortly to become of general adoption. Consequent on the interesting experiments made, in 1862, by MM. Bérard and Audouin, under the direction of MM. Dumas and Regnault, the Parisian authorities have replaced the old burners by an iron bat's-wing of uniform size, having a slit 0·6 millimètre in diameter, and consuming 140 litres (5 cubic feet) per hour, this form having been found the best of any that has yet been experimented on.

They have recently experimented on the steatite jet adopted for gas lighting at Vienna, and known in Germany under the name of "Spaarbrenner," or "Economic jet." Comparing this with the ordinary "bat's-wing," much employed for public lighting in Paris, the following results have been arrived at.

On regulating the Paris burner for the consumption of 140 litres per hour, it was found that the Vienna burner gave the same lighting power with a consumption of only 129 litres, showing an economy of 6·1 per cent. In regulating the two jets, so as to consume each 140 litres per hour, the Vienna jet gave a superior lighting power of 6·6 per cent. over the Parisian.

The Parisian jet burns under a pressure of 2·7 millimètres (0·1063 inch), while the steatite Vienna jet burned under a pressure of 3·5 millimètres (0·1378 inch). Consequent on these results, it was resolved to adopt the German jet in 3000 lamps in Paris.

SOCIÉTÉ TECHNIQUE DE L'INDUSTRIE DU GAZ EN FRANCE.

In our issue of June 16, p. 831, vol. xxiii., we gave some particulars referring to an intention to form a gas association under the above title, similar to the British Association of Gas Managers and Engineers in England. Our Paris correspondent informs us that the society held its first meeting on the 23rd of June. The principal object of the meeting was that of settling the rules proposed by the first 84 foundation members. After the election of the committee the following officers were chosen for 1874–5:—President, M. A. Mallet; Vice-President, M. Emile Vauthier; Secretaries, MM. Albert Ellisen and Edouard Servier; Treasurer, M. Charles Foucart.

The president, in a short address, drew attention to the advantages which the society offered to its members by means of co-operation, exchange of ideas, and the union of interests.

The afternoon was devoted to the discussion of communicated papers. Of course the sitting was chiefly an indication of the future programme of labour. M. Servier, in the name of the committee, enumerated the various questions which would be of most interest to study in the developing of gas manufacture.

M. Ellisen and M. Jordan, the president of the "Société des Ingénieurs Civils," passed in review the various attempts that had been made in England and the United States to replace the labour of workmen by machinery in gas-works. They specially named the results which had been attained by the inventions of Messrs. Somerville and Robinson, and Mr. Foulis, and they urged French engineers to study this interesting problem, especially in regard to the adoption of machinery in the small gas-works in France. M. Rouget gave some interesting accounts of the work of his meter, to which we called attention in our issue of June 9, page 797 *ante*. "The judicious observation of the worthy president of your British Association of Gas Managers, at the late meeting in London, may induce us to enter into further details of M. Rouget's invention, which promises to register exactly the amount consumed, which, as now registered, is generally from 2 to 3 per cent. against the receipts of the gas company from the consumer." After some remarks on MM. Pélouze and Audouin's condenser, gas purification, &c., &c., it was resolved to appeal for the support of the society to all persons engaged in gas manufacture, directly or indirectly, in France. It was resolved also to call an extraordinary meeting next October to elect new members in anticipation of the general meeting to be held in May, 1875.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JULY 6, 1874.

The Belfast Corporation Gas Bill was read the third time, with the amendments, passed, and sent to the Commons.

The Shipley Local Board of Health Bill was returned from the Commons agreed to, with amendments, which were considered and agreed to.

The Middlesborough Extension and Improvement Bill was returned from the Commons with the amendment, to which the Lords have disagreed, not insisted on.

TUESDAY, JULY 7.

The Edinburgh and District Water Bill was reported from the Select Committee, with amendments.

The Ulverston Local Board Bill was read the third time, with the amendment, passed, and sent to the Commons.

The Dublin Corporation Water Bill was read the third time, with the amendments, passed, and sent to the Commons.

THURSDAY, JULY 9.

The Cupar Water and Dundee Water Bills were reported, with amendments.

FRIDAY, JULY 10.

The Edinburgh and District Water Bill was read the third time, with the amendments, passed, and sent to the Commons.

The Alliance and Dublin Consumers Gas Bill was returned from the Commons agreed to, with amendments, which were considered and agreed to.

The Nottingham Corporation Gas Bill was returned from the Commons agreed to, with an amendment, which was considered and agreed to.

The Nottingham Water Bill was returned from the Commons agreed to.

The Belfast Corporation Gas, Belfast Water, Skipton Local Board of Health, and Wigan Improvement Bills were returned from the Commons, with the amendments agreed to.

HOUSE OF COMMONS.

MONDAY, JULY 6, 1874.

The Sanitary Laws Amendment Bill was considered in committee, and reported; to be printed as amended, and recommitted for Friday, July 10.

TUESDAY, JULY 7.

The Alliance and Dublin Consumers Gas, and Nottingham Corporation Gas Bills (Lords), as amended, were considered; to be read the third time.

The Nottingham Water Bill (Lords) was reported, without amendment; to be read the third time.

THURSDAY, JULY 9.

The Lords amendments to the Belfast Water, Skipton Local Board of Health, and Wigan Improvement Bills were agreed to.

A petition for alteration of the Sanitary Laws Amendment Bill was presented from Berkhampstead.

The Ystrad Gas and Water Bill (Lords) was reported, without amendment; to be read the third time.

FRIDAY, JULY 10.

The Lords amendments to the Belfast Corporation Gas Bill were agreed to.

The Alliance and Dublin Consumers Gas Bill (Lords) was read the third time, and passed, with amendments.

The Nottingham Corporation Gas Bill (Lords) was read the third time, and passed, with an amendment.

The Nottingham Water Bill (Lords) was read the third time, and passed.

SANITARY LAWS AMENDMENT BILL.

On the order of the day for going into committee on this bill,

Mr. SCLATER-BOOTH gave an explanation of its object. He said that by clauses 19 and 20 the Local Government Board took fresh powers to execute works which might be deemed necessary. It was proposed, among other things, that the board should have power to obtain a writ of *mandamus*, with the view of compelling a local authority to execute works which might be considered necessary. There was a very important clause giving power to local authorities to obtain from the magistrates an order to prevent the use of wells, pumps, or cisterns which were considered unhealthy. The question of the water supply was becoming an urgent one for the whole country, and perhaps before long Government would be able to propose some general provisions on the subject, of a kind which would be greatly to the advantage of the community.

The House then went into committee on the bill.

On clause 31, which incorporates the Lands Clauses Consolidation Act,

Sir G. BALFOUR said he thought it would be well if power were given to combine several districts together, so as to enable each of them to get a better supply of water. A more abundant supply, and water of a much better quality, might frequently be obtained by going some distance for it. But at present districts could not combine for this purpose without coming to Parliament for powers, and that was very expensive. He hoped that the honourable gentleman in charge of the bill would, on bringing up the report, introduce some provision by which this object could be effected.

Mr. STANSFELD said the power which the honourable member sought to give already existed. On the application of a sanitary authority, the Local Government Board could form a united district for a common supply of water or for any other purpose.

Mr. WHALLEY thought the clause suggested by the honourable baronet would be inadequate. What was really wanted was the power to go to any place where an abundant supply of water could be obtained. His honourable friend below him (Mr. Morgan Lloyd) had a clause on the paper which might effect the object.

Mr. SCLATER-BOOTH said the clause which the honourable gentleman had on the paper had not escaped his attention. As had been stated, the powers which already existed, or would exist when this bill was passed, would enable the authorities to go out of their own district to obtain a supply of water in the manner proposed by the honourable gentleman.

Sir F. GOLDSMID remarked that care must be taken, when giving a sanitary authority power to obtain water out of their district, that they did not interfere with other districts.

Mr. SCLATER-BOOTH said none of these powers could be exercised without publication of notice.

The clause was then agreed to.

Mr. MORGAN LLOYD moved to insert the following provision after clause 33:—"Any sanitary authority may, for the purpose of supplying its district with water for drinking and domestic purposes, purchase, either within or without its district, any land covered with water, or any water, or right to take or convey water, in the same manner and subject to the same regulations in and subject to which it may purchase land within or without its district. And the word 'land' shall, in the enactments relating to such purchase, be deemed to include any water or right to take or convey water."

Mr. GREGORY objected to the clause as unfair and unnecessary. It was unfair to the existing companies, who were willing to give a proper supply of water, and who, he considered, ought to be protected, and not unduly interfered with; and it was unnecessary, because at present there was ample power to obtain a supply of water for any district not adequately supplied by an existing company.

Mr. WHALLEY said this was in fact the old question over again. In some districts the water supplied by the water companies had been declared on the highest authorities to be unfit for use. It was not proposed to do more than to afford to the local authorities reasonable means of obtaining a supply of wholesome water. The remedy was now almost impracticable, because it involved an application to Parliament, and the sanitary authorities had a vested interest and the resources of the companies to contend with. On the other hand there would be abundant opportunity, by local inquiry, to afford the companies all the protection they were fairly entitled to. He hoped, therefore, that the right honourable gentleman would agree to this amendment.

Mr. CAWLEY said the honourable gentleman who had just sat down had misrepresented both the effect of this clause and the state of the law at this moment. If it were true that the water supplied by an existing company was unwholesome, then the company were not fulfilling their contract. But he contended that the local board ought not to have these powers so long as the existing companies were able and willing to give a good supply of good water. If they did not give this supply, then it was open to the local board now to come to the Local Government Board, who could give compulsory powers of purchase; but those compulsory powers could not be put in force without a compulsory order. But they ought not to give the local body power to purchase irrespective of the Local Government Board; and, if they did, such powers ought not to be given in a bill like this. There were ample powers now to purchase by coming to Parliament for a Provisional Order. If they agreed to this amendment they gave the powers without coming to Parliament, and that, he thought, they ought not to do.

Mr. SCLATER-BOOTH said he hoped the honourable and learned gentleman would be satisfied with the discussion which had taken place on this proposal, and would feel that the Local Government Board will make the best provision it can for the supply of water. He had considered the amendment, and certainly could not consent to the introduction of these words as they stood; but it might stand over, and he would see whether he could introduce some amendment on the report.

Mr. WHALLEY said the clause did not at all endanger the existence of vested interests beyond what it ought.

Mr. MORGAN LLOYD said, after the promise which had been made by the president of the Local Government Board, that the matter should be considered on the report, he would withdraw his amendment.

The amendment was then by leave withdrawn, and the other clause having been gone through, the bill passed through committee.

HOUSE OF LORDS.

TUESDAY, JULY 7.

(*Before the Duke of* SOMERSET, *Chairman; the Earl of* BANDON, *Viscount* HERTFORD, *Earl* LIMERICK, *and Lord* EMLY.)

EDINBURGH AND DISTRICT WATER BILL.

Mr. CLERK, Q.C. appeared for the promoters; Mr. GRANVILLE SOMERSET, Q.C., Mr. SHIRESS WILL for the Chamber of Commerce of Leith, and certain owners of steamboats at that port; and Mr. JENNER for Mr. Romans, in opposition to the bill.

Mr. CLERK said the object of the bill was to provide an additional supply of water for the city of Edinburgh, the town and port of Leith, the town of Portobello, and the districts and places adjacent. The preamble of the bill set out that the Edinburgh and District Water Trustees were created in 1869. Prior to that there had been a water company which supplied these districts with water, but in 1869 their powers were transferred to a trust then created, which consisted of persons nominated by the three corporations of Edinburgh, Leith, and Portobello, and the chief magistrates of these three places. At that time there was a great want of water in Edinburgh, and in 1871 the trustees introduced a bill into Parliament for the purpose of bringing water from St. Mary's Loch—a locality which was about 36 miles away from Edinburgh. That scheme met with great opposition on the part of the ratepayers in Edinburgh, Leith, and Portobello, and it was rejected in their lordships House. No further steps had been taken by the Water Trustees from that time until the present year for the purpose of supplying Edinburgh with water, although a great deficiency still continued to be experienced. It happened that in 1871 and 1872 there were two very wet summers, so that fortunately there was not that great suffering from the deficiency of the supply which was experienced in 1869 and 1870. The trustees were further prevented from proceeding by steps having been taken in Edinburgh to prevent them from paying the costs incurred in 1871 out of the rates. Therefore the Water Trustees felt themselves in considerable difficulty as to how they were to proceed, finding that they would have to proceed at the individual risk of the persons promoting, unless some means were taken enabling them to apply to Parliament at the cost of the ratepayers. Now, one of the things arranged for in the present bill was that the powers to obtain this necessary supply of water were sought not only by the Water Trustees but by the Corporation of Edinburgh, who had funds of their own available for that purpose; and one of the provisions of the bill was to enable the trustees, out of the rates to be collected, to pay the expenses incurred in 1871, which now met with entire approbation on the part of all classes in Edinburgh. The plan now before Parliament, instead of wandering away 36 miles from Edinburgh in order to get a supply of water, was to look for getting a sufficient supply from the range of hills called the Moorfoot Hills, which were only a few miles from Edinburgh. In these hills there was a bountiful supply of water at the present time, entirely untapped by any water company. This was the first time that the Water Trustees had come to Parliament seeking powers to give the supply of water so much demanded from this source, but it was right that he should tell their lordships that last year a number of gentlemen obtained an Act enabling them to get water from a district called the Manor district, in the county of Selkirk, and to bring that water for sale in the county of Mid-Lothian. There was no power taken in that Act to supply Edinburgh except by agreement with the Mid-Lothian Water Company. It was also necessary that he should mention that in 1871 the people of Musselburgh introduced a bill into Parliament for the purpose of supplying themselves, and also the town of Dalkeith, with water from the same district from which the promoters now sought to get their water supply, instead of from Edinburgh. The Dalkeith people, declining to do with the Corporation of Musselburgh, the consequence had been that nothing had been done. Under the provisions of this bill the powers obtained in 1871 with regard to compulsory purchase would expire in 1875, and the probability was that nothing would be done for the purpose of supplying Musselburgh and Dalkeith with water. It did so happen that on the stream of the South Esk there was a mill called Newbattle Mill, situated very near the property of the Marquis of Lothian, and if the Musselburgh people had exercised their powers of taking the water from the South Esk, they could, of course, have abstracted water from that stream, and they were bound by the Act of 1871 to give to that mill a certain amount of compensation. He was happy to say that, by arrangements come to both before they came into Parliament this year and during the progress of this bill in the other House, everybody who then appeared against the bill had been settled with, and the promoters were under the belief that there would be no further contest with regard to the supply of Edinburgh with water, which he was sorry to say had been the cause of a great deal of unpleasant discussion for many years in Edinburgh, and had been attended with a most lavish waste of money. It appeared now, however, that there were three petitioners before their lordships against this bill, none of whom appeared in the other House of Parliament.

Mr. G. SOMERSET and Mr. JENNER intimated that the opposition of their respective clients was not directed to the preamble, but to certain clauses in the bill.

Mr. CLERK, proceeding with his address, said that when the bill was introduced into Parliament this year to take water from the South Esk, it met with opposition from all the principal proprietors on that stream, including the Duke of Buccleuch, Lord Dalhousie, and the Marquis of Lothian, on the ground that in taking the water at the place where the promoters were proposing to take it, they should be taking most of the best spring water from the district, and a stipulation was inserted in the bill in the House of Commons, that the promoters should give, in consideration of being allowed to do that, a certain amount of compensation to these proprietors. All these were riparian owners, who had a right to the water in the stream, and, therefore, were entitled to

impose terms upon the promoters to the effect that, in removing any water from that stream they should leave it in as good a condition hereafter as it was at the present time. The learned counsel then referred to the allegations in the petition of Mr. Romans, who was, he said, the owner of the estate of Newton Grange, consisting of eight acres of land in the parish of Newbattle, and who seemed to think that there was some undertaking to provide the parish of Newbattle with water, and not the riparian proprietors simply. Mr. Romans alleged that he had expended £10,000 in buildings and improvements on the said estate, on which at present upwards of 100 tenants with their families were residing, whose supply of water for domestic purposes was obtained from wells which frequently failed, and that in dry weather water had been taken in carts from the river of the South Esk, which was a distance of nearly half a mile off. The petitioner submitted that the proposition of compensation water to be given to the estate of Newbattle should be increased, and that a share of it should be secured to him. Now, he had to submit that Mr. Romans had no *locus standi* to be heard against this bill. It was a principle in both Houses of Parliament that no petitioner could be heard against a bill unless there was something in it which interfered with his rights. Mr. Romans had no rights whatever, not being a riparian proprietor on the stream; and if a person residing half a mile away were to be allowed to come to those who were taking the water in the upper portion of the stream for the purpose of supply and demand compensation, where could their lordships draw the line? Either he had a right to the water, or he had none. The promoters had agreed to supply water to the riparian proprietors, and what Mr. Romans was asking was that we should lay down pipes for a distance of half a mile to give him water free of charge, in exchange for water to which in law he had no right at the present moment. There was another petition presented against the bill from the Chamber of Commerce of Leith, who he certainly thought had no *locus standi*, and from steamship owners in the port of Leith. With regard to the latter, they were asking to have a different rate inserted in this bill by their lordships from that which now existed in all Acts of Parliament affecting the water supply in Edinburgh. When this question was in the other House of Parliament, and when all parties affected by rating appeared, these gentlemen who were now petitioning did not appear, and their lordships would be well aware that it was a very inconvenient thing in their lordships House to have the question raised by one party, because it was calculated to disturb the whole of the arrangements come to with regard to rates with all other parties who had an interest in the subject. In the third paragraph of the petition, the petitioners stated that the rate now charged and proposed by the bill to be continued for water supply to shipping at the port of Leith was 1s. 6d. per ton, whereas the charge to brewers, distillers, manufacturers, and hotel-keepers was 9d. per 1000 gallons; that the bill gave power to railway companies, who might feel aggrieved at the price charged for water, to appeal to the sheriff of the county, and that no such power was given to the petitioners. This was a matter which was settled with the steamship companies some years ago. In 1856 an arrangement was come to whereby the company were to be at liberty to charge a maximum toll of 1s. 6d. per ton upon all water supplied to shipping, and the shipmasters were to have this advantage, that they were next to be supplied after the persons taking water for strictly domestic supply. The arrangement was therefore a perfectly fair one, and it had existed down to the present time. It was one which they had never before sought to disturb, because in 1869, when the Water Trustees were taking over the whole of the water supply of Edinburgh, Leith, and Portobello, with all its obligations, the clause giving effect to this arrangement was repeated without any complaint on the part of the shipping interest of Leith. In consideration of the priority of position in which they were placed as regarded a supply of water, they were satisfied to have that maximum charge of 1s. 6d. per ton continued, and to alter the rate now would be entirely to alter the terms of the arrangement come to between the trustees acting on behalf of the ratepayers and the water company in 1869. He respectfully asked their lordships to refuse to listen to this proposal on the part of the shipping interest of Leith, but to leave them in the position in which they stood at the present time.

Mr. JENNER, in support of the *locus standi* of Mr. Romans, said that the estate of Newton Grange had been in his family for upwards of three centuries, and that during that long period they had been in the habit of using the water from the South Esk when the wells on the estate ran dry. Mr. Romans had not the slightest wish to obstruct the city of Edinburgh in endeavouring to obtain an ample supply of water. He was himself a member of the Town Council, and had tried at all times to further schemes for the amelioration of the city; but at the same time it should be remembered that charity began at home, and if this bill should pass without some provision being inserted for giving compensation to Mr. Romans, he would in dry weather be left without any water. The promoters had agreed to give Sir William Johnson, of Kirkhall, on whose property there were only about ten people, 2000 gallons of water; and all that Mr. Romans, with 125 people on his estate, asked was that they should be forced to supply them with 5000 gallons of water.

Mr. CLERK said the question immediately before the committee was that of the *locus standi* of Mr. Romans, who was not a riparian proprietor, to be heard against the bill. Mr. Romans should be left to make arrangements to purchase water like other people, if he stood in need of it.

The CHAIRMAN asked whether Mr. Romans appeared in opposition to the bill in the House of Commons.

Mr. JENNER said he did not, as he was informed that his rights would be protected.

Mr. CLERK denied the correctness of the statement.

The COMMITTEE consulted for a short time, after which

The CHAIRMAN said they were unanimously of opinion that Mr. Romans had no *locus standi*.

Mr. *James Cowan*, M.P., examined by Mr. CLERK.

I am one of the members for the city of Edinburgh, and was Lord Provost of that city until I was elected a member, when I resigned the office. For many years I have taken a great interest in the question of the supply of water to Edinburgh. For years past the want of water during the summer months has been very much felt. Owing to having wet winters in 1871 and 1872, the want has not been so much felt as in the two preceding years. The object of this bill—it meets with general concurrence in Edinburgh—is to obtain a supply of water from the Moorfoot Hills. These are a range of hills opposite the Pentlands, from which we at present obtain a supply. No water has yet been taken from the Moorfoot Hills for the purpose of a town supply. In 1871 the trustees introduced a bill for the purpose of getting water from St. Mary's Loch. The bill met with a great deal of opposition from the ratepayers of Edinburgh, and, though it passed the House of Commons, it was rejected by the House of Lords. A large sum of money was spent in the promotion of that bill, which materially hampered the trustees from that time to the present in introducing a bill into Parliament for giving additional supply of water to Edinburgh, Leith, and Portobello. The present bill is promoted by the Corporation of Edinburgh, along with the Edinburgh and District Water Trust, and the proposal embodied in the bill for paying the expenses incurred in 1871 has undoubtedly met with the general approval of the ratepayers.

Mr. CLERK: Do you know anything about the Act of 1856, and the arrangement which was then come to with the shipping interests at Leith?

Witness: I am not sufficiently conversant with that matter to give any opinion respecting it.

Mr. CLERK: But I believe there is no opposition to any part of this bill except that arising in Leith with regard to the supply of water to steamship companies?

Witness: I believe not.

Cross-examined by Mr. WILL: We shall get into Edinburgh by this scheme about eight million gallons a day, so that we shall have an abundant supply. At present the supply is about 30 gallons per head, but in excessively dry weather that would come down as low as 10 gallons per head. The steam shipping in Leith has enormously increased since 1856.

Mr. WILL: Under the Act of 1869 we have heard that shipmasters were to have water at a certain rate, not exceeding 1s. 6d. per ton; and then the section goes on to say that breweries, distilleries, manufacturers, hotel-keepers, and other persons requiring an extraordinary supply of water shall have water according to an agreed rate, with this proviso, that the rate shall be subject to appeal to the sheriff in case these persons should think them too much; and the Act also provides that as far as possible the rate for such supply shall be uniform. That is so, is it not?

Witness: I have no doubt it is so, if you are reading from the Act. I do not know whether it is a fact that some of the steamers plying between Leith and London require as many as 3000 and 4000 gallons, but I know that they require a very large quantity.

Mr. WILL: Can you tell their lordships any reason or principle why the supply of water for steam-engines on shore and railway purposes should be at a cheaper rate than that to sea-going steamers?

Witness: I never had anything to do with the rates of the water company, and I never like to give any opinion in a hurried manner, but I should be inclined to say, of course, that the charge should be the same.

Lord Provost *Falshaw*, examined by Mr. CLERK.

In former days I was engaged largely in constructing railways and reservoirs, and know the cost of the supply of water for steam purposes. I have considered the question with every desire of dealing fairly with the shipping interests of Leith. Under the Act of 1869 there is a maximum of 1s. 6d. per ton, while railway companies only pay 9d. per 1000 gallons, but we are quite prepared to make a reduction.

Mr. CLERK: Could it not be left as a matter of arbitration or reference to the sheriff?

Witness: The Water Trust would be glad to enter into a fair and reasonable arrangement with them, and, in case of terms not being arrived at, an appeal to the sheriff might be had.

Mr. CLERK: You are willing that there should be a reduction upon this maximum charge in reference to the shipping interests?

Witness: Perfectly.

Mr. CLERK: I think we may agree upon words which shall carry that intention out. I would propose that clause 56 of the bill should be amended so as to read as follows:—"Nothing contained in this Act shall alter or affect the obligations imposed upon the trustees by the 63rd section of the first recited Act, or the rights of the parties referred to in that section, to supplies of water in the manner and upon the terms therein mentioned—provided nevertheless that any steamship company, or owner of steamships, or any railway company, or the trustees, may from time to time apply to the sheriff, or any of the sheriffs-substitute referred to in that section, to fix or revise (subject to the maximum rate therein mentioned with respect to supplies of water for steamships and railway purposes) the rate at which the supply to such steamship companies, owners of steam vessels, or railway companies shall be supplied, and that the rate so fixed or revised shall be the rate leviable by the trustees in respect of such supply, unless and until altered by the sheriff or sheriff-substitute upon a similar application."

Mr. WILL said they were ready to acknowledge the courtesy with which they were treated by the promoters. The alteration proposed in the clause would meet the case of his clients, and he therefore retired from all opposition.

The preamble of the bill was declared by the committee to be proved, and the clauses were gone through and settled.

Legal Intelligence.

VICE-CHANCELLOR'S COURT—SATURDAY, JULY 4.

(*Before Vice-Chancellor* HALL.)

In re THE AIR GASLIGHT COMPANY, LIMITED.

Ex parte MURRAY AND OTHERS, AND *ex parte* PUCKLE AND ANOTHER.

Mr. DICKINSON, Q.C., and Mr. M. COOKSON were for the first petitioners; Mr. LINDLEY, Q.C., and Mr. LOCOCK WEBB were for the second petitioners; Mr. GREENE, Q.C., Mr. KARSLAKE, Q.C., Mr. GRAHAM HASTINGS, Mr. W. W. KARSLAKE, and Mr. WILKINSON were for the several respondents.

Mr. DICKINSON said there had been filed two affidavits, stating what had taken place since these matters were before the court on the last occasion. His honour would recollect what the report of certain experts was who had made a report, and who had pointed out that the invention itself, in its present condition, could not compete with coal gas, and with regard to the financial consideration, that they referred to a committee of investigation. It would also be recollected that no further report had come from the committee of investigation. Mr. Dolman, who was the chairman of the company, in his affidavit stated that a meeting was duly summoned to be held at the London Tavern on Wednesday, the 1st of July. Certain cash accounts were presented at that meeting and certain resolutions were passed. An amendment to the first resolution was proposed, for which seven shareholders voted, out of about 80 who were present at the meeting, and the other resolutions were carried without any dissentients. There were also presented cash accounts. The first resolution was this—"The meeting having heard the report of the committee of investigation now presented to them by the directors, considered the same satisfactory, with the assurance now offered them by the chairman that further efforts would be made in extension of the duty already undertaken for making a financial report on the affairs and position of the company." The financial position of the company having been also submitted and explained, the meeting accepted the same in confidence that the directors would persevere in the economies they had already initiated. The second resolution was that Messrs. Jones and Lord, two of the directors, not having resigned, be removed from their position as directors; that Mr. Lord be also removed from his office of managing director, and that the directors be authorized to settle with Mr. Lord the amount claimed by him upon the terms of his letter of the 4th of March, or otherwise as they might think fit. The third resolution was that the shareholders then assembled again desired to express their opinion that the two petitions to wind up the company now before the court were presented in bad faith; that, inasmuch as it appeared that the directors gave the weight of their authority to such petitions, and, as directors, instructed their solicitors to appear and consent to orders thereupon, and that the costs charged against the company of such petitions amounted to £71 5s. 10d., the proprietors urged that the petitions should be forthwith dismissed with costs as against the petitioners. To this there was an amendment moved, that, having regard to the long-continued unproductiveness of the patents sold to and acquired by the company, the meeting was of opinion that the voluntary winding up was highly desirable, and therefore recommended the directors to adopt such measures as were necessary to accomplish that. That amendment was lost. Certain accounts were exhibited, which he supposed were the financial considerations referred to, and which it seemed were thought satisfactory. In the first place there were losses. In the first affidavit filed on behalf of the petition was a statement that nothing really

had been done except by attempts to carry on the invention at the Crystal Palace, at Tiverton, Richmond, Holborn, and Dublin. The losses were stated to be—at the Crystal Palace, £1947; Tiverton, £159; Richmond, £160; Holborn, £695; and Dublin, £10 4s. 6d., in addition to the cost of gas consumed. In addition to losses there were expenses, including the salaries and directors fees, amounting to nearly £5000, and travelling expenses amounting to £1560. Against that the profits were to be set. There was a profit on the sale of apparatus and royalties of £324; transfer and other fees, £37; interest on deposit so much; but the loss was £9224 14s. 7d. In fact, the statement was that everything that had been done to bring the patent forward had resulted in a loss as stated originally in the affidavits on the part of the persons who filed the petitions; that the thing itself, although a clever and pretty invention, was one which, commercially speaking, was utterly useless. That was practically the report of the experts. The next account was called a balance-sheet to the 31st of December, 1873. It started with capital of £200,000, in 40,000 shares of £5 each, of which £5000 had been subscribed for, and upon which £4 had been called up. From this there were deductions in respect of calls unpaid amounting to £6176. There were also 13,972 shares upon which £5 had been paid, making a total in respect of shares of £114,363 10s. Then there were creditors to the amount of £569, and disputed claims to the amount of £564, and the fees due to the old directors, but which the old directors had not taken, but carried to a suspense account, amounting to £740 12s. 4d. Then they started with preliminary expenses, £3635 14s. The purchase-money for the patents, and the cost of obtaining some of them, was £101.000. There were also some utensils and things worth £250, office furniture £290, and a sum of about £500 from debtors for apparatus, and cash at bankers £708. The suspense account for disputed claims was £564, and the total was made up by the net loss £9224, as he had already stated. In that way of making out the accounts, when they came to treat of assets, it was always found that the largest feature of assets was the money which was spent, namely, £101,000, besides which the assets were frivolous and trifling.

The VICE-CHANCELLOR said there were £705 of actual costs, and £6000 on calls not paid up. There was also £1 on 12,645 shares not called up.

Mr. DICKINSON said that was so. There was another account of assets and liabilities to July 1, 1874. The assets were arrears of allotments, and arrears of calls, machinery and plant, office furniture, and it come very much to the same thing as before. The cash at bankers had been increased, because there had been a sum paid in of £376, but against that there had been an awkward payment out in the meantime, leaving practically, at the bankers, a balance of £45 11s. 6d., with a remarkably petty cash in hand of £3. Nothing had been done except presenting that to the meeting which had been held to consider what should be done, and they accepted that statement of the finance, and considered it was possible to go on. He was quite sure his honour would recollect that the gentlemen whom he represented, who were shareholders having a considerable number of shares, which were not paid up, presented their view to the court, which was that they had subscribed to the undertaking, and became members of the company upon the faith of representations made to them upon the mode in which the thing had been tried, and that it could be carried into effect profitably and inexpensively.

The VICE-CHANCELLOR said he understood on the last occasion that there had been something stated about contracts with Manchester and elsewhere.

Mr. DICKINSON said there was an affidavit from Mr. Harrison, who was the inventor, and who, with his nominees, held an immense amount of paid-up shares, who described himself as the patentee in conjunction with his son. He said he had received an offer from the Protector Lamps and Lighting Company of Manchester to take not less than £1000 worth of the company's machinery, together with other offers from various persons in the principal manufacturing towns throughout the country, and all the principal foreign countries, such as Brazil, Calcutta, Bombay, Hyderabad, &c., for which countries the company possessed upwards of 30 patents. He supposed the orders would be produced.

Mr. GREENE said they were in court on the last occasion.

Mr. DICKINSON stated that the offers were said to be subject to the dismissal of the petitions, and to the company being once more placed in a responsible position, when the arrangements entered into with the District Railway Company would be carried into effect. He supposed the offers from Brazil, Bombay, &c., were in writing.

The VICE-CHANCELLOR inquired whether the offers referred to were in court, and said if not they must be sent for.

Mr. GREENE promised this should be done.

Mr. DICKINSON continued his statement by saying that Mr. Harrison in his affidavit stated that as one of the directors he was present at the meeting held on the 1st of July, and the shareholders then present were almost unanimous in their votes that the business should proceed under the new directorship, and the petitions be dismissed with costs. His honour would recollect that the first occasion upon which the petitions came before the court was the 17th of January in the present year. The court then directed that the petitions should stand over with a direction to summon on the 20th, a meeting to be held on the 28th of January. At that meeting a committee of seven gentlemen were appointed, called a committee of investigation, and the subject which was referred to that committee, was whether the company could carried on at a profit. The committee being so appointed, themselves consulted certain experts, who made their report to the committee, dated April 1, 1874, of which his honour had heard. That report was with reference to such parts of the invention as had been before the committee. The first report which the committee of investigation made was one in which they stated that fresh patents had been taken out since the original patents, which the committee wished to inquire into, and that being so, there was a meeting on the 12th of May in this year, at which they desired an extension of time to enable the committee to make their report. Then the committee made their report, but they had done so without any statement whatever with regard to the further patents in question, and without any statement upon the financial consideration of the matter which the experts said should be left to the committee of management, because the experts said as far as they had the materials before them, the thing, though clever, and though it might be carried on by persons who wished to have such things in their mansions, in churches, and so on, yet it could not be carried on in competition with coal gas at a profit. There had been no financial statement at all to which the committee had addressed themselves. They had communicated to the company the balance-sheet and statements to which he had drawn attention, but that was not the financial consideration as to how the business could be carried on at a profit. If it should be suggested that that was the mode of considering the financial consideration, the result had been simply deplorable, because every attempt to bring the thing into practice was to do so at a loss. That being so, he would call his honour's attention to what had been done in court. To his astonishment, the case was restored to the paper on the 20th of February, 1874, nothing having been done at that time except holding the meetings and passing the resolutions. There was all the expense to which all parties were driven by the thing being so improperly restored to the paper. They were not satisfied with that. Again, on the 12th of June, they came into court again, and it was adjourned till the next petition day, and came on on the 20th of June, still without any materials to enable the court to determine what should be done with regard to getting at the facts which the court itself had suggested. He (Mr. Dickinson) contended that almost the same thing had been done now because they were in almost the same position as they were before. He acknowledged that throughout there had been a majority of shareholders who had been desirous to have the petitions dismissed. But who were those shareholders. Half the company almost was taken up by Mr. Harrison and his nominees, who held paid-up shares. There were shareholders who did not hold paid-up shares, no doubt, and who desired the thing to go on. There were persons who had no interest whatever in the matter, except to be saved, and they said the condition of things was such that it was not a question whether the thing could be carried on at a profit; but that it was morally impossible to do so at all, unless there was something in the further patents in respect of which the committee of investigation required further time, and as to which there was a positive silence. Then there was a talk of orders from all parts of the world, which were said to be made conditional upon the petitions being dismissed. If it were meant by that that the company were to supply the things, and the company, being wound up, could not supply them of course that would be so; but it was mentioned as showing that the business could not be carried on because of the pendency of the resolutions. If the law were such that a certain number of the shareholders having paid-up shares could insist on the full amount of the shares for which the unpaid shareholders had subscribed being paid up, the court would so decide, and not order a winding up. But he had not the slightest hesitation in asking the court whether, supposing the law to be as he had suggested, there was not sufficient foundation for the petitions; and that the necessity for investigation was so apparent that the persons who were opposing the present petitioners were determinately shrinking from investigation, shutting their eyes to the condition of things, and insisting upon the company going on with ruin to themselves, as unpaid-up shareholders, and all others in a like position. Except that he deprecated the rolling on of expense, he would say that there were not now sufficient materials before the court. But he thought the best thing would be for the court to come to some decision, and if his honour felt that he was bound to dismiss the petitions, he submitted that, under the circumstances, they ought to be dismissed without costs.

Mr. LINDLEY said, with respect to the charge of bad faith, he would ask what the grounds were upon which Messrs. Puckle and Wilkinson presented their petition, and whether those grounds did or did not exist. The grounds which they alleged were that the invention had proved to be worthless, and that the objects for which the company was formed had failed. They said that the company had been unable to enter into or conclude any contracts for the supply of air gas, and had universally failed in their endeavour to introduce their system of lighting, except for experiments. They also said that serious difficulties had been found to arise in working the inventions. There was no mis-statement in that; every word of it was true, and was borne out in every respect by the evidence before the court. The experts, whilst admitting that it was a clever invention, stated that it could not compete with coal gas. Were the shareholders, steered and directed by Mr. Harrison, justified in saying that the petition was presented in bad faith? The other shareholders chose to say they would go on—they were more sanguine—but they did not controvert the facts in the least; and as to the supposed offers, none of them had been seen, nor was anything known as to the probable profit or loss to be obtained from executing those orders. All they knew was, that upon every transaction there had been a loss, with the single exception of selling some apparatus at a small profit of £324 6s. The aggregate losses had been £3000. The company seemed to be able to manufacture their apparatus for something less than they got when they sold it, but when they came to work their invention they lost upon every occasion. Then the question was whether the majority had a right to go on, having regard to the Suburban Hotel Company's case. Supposing the court should come to the conclusion that the majority might go on if they liked, he would ask whether some terms could not be imposed. The person who wanted to go on was the patentee, who was the master of the situation. The report stated what Mr. Harrison abstained from saying, that the shareholders were encouraged by the fact that Mr. Harrison, the patentee, who held shares fully paid up to a money value representing £65,000, was willing to claim no profit upon his shares until the other shares had received a dividend at the rate of 10 per cent. He would ask whether Mr. Harrison was willing that the company should go on upon those terms.

The VICE-CHANCELLOR inquired whether Mr. Harrison was willing to abide by that offer.

Mr. GREENE said he had no instructions, nor did he think it was a reasonable request.

Mr. DICKINSON said he had now the orders which had been referred to. One was a letter dated June 30, 1874, which was an order for one air gas machine for 30 lights complete, with a direction for it to be in Rio by September. The next was a letter from Bombay, the writer offering to become the sale agent of the company, and suggesting the lessening of risk by explosion. The next was dated the 22nd of May, from Brussels, and it was a letter from a gentleman offering to become an agent of the company. The next was from Manchester, from the Protector Lamp and Lighting Company, Limited, asking for testimonials and stipulating for a commission.

The VICE-CHANCELLOR said it appeared to him that he had no discretion, having regard to the case which had been decided upon the subject, than to do otherwise than dismiss the two petitions. (His honour then referred to the Suburban Hotel Company's case, reported in 2nd Chancery Appeals, and the Joint-Stock Coal Company's case in 8th Equity.) In the present case there had been a very considerable amount of expenditure, without any profit arising from it. But there was still a very considerable sum, almost twice the amount of that expenditure—putting out of consideration the price paid for the patents, and the expense of working them—still available, unless the shareholders could not pay, and there was no evidence to show that they could not pay. Although there were considerable arrears not paid up, some part had been paid up since the matter was last before the court, and there was a considerable amount not called up, which could be called up from those shareholders who were not in arrear. Therefore, there being a certain amount of capital, which, according to the original contract between the parties, was intended to be applied in working the concern, he could not, having regard to the decisions referred to, take upon himself to say that the thing was an impossibility, or that anything could not come out of the concern. Therefore, the petitions must be dismissed; and, in dismissing them, he could only say that, as regarded "bad faith," he did not see that any case of that kind was established as against the petitioners. But at the same time he did not see that he could do otherwise than act upon the view which the Lord Chancellor acted upon in the Suburban Hotel Company's case, where he said that it was always desirable, unless there were distinct and special circumstances, not to depart from the general rule, that the unsuccessful party should bear the costs of litigation. Adopting that view in the present case, both the petitions would be dismissed, with costs.

FRIDAY, JULY 10.

(*Before Vice-Chancellor* MALINS.)

In re THE PETERSBURG AND VIBORG GAS COMPANY.

Mr. GLASSE, Q.C.: Sir, in this case an appointment has been obtained before the examination upon an early day in August. Naturally the respondents object to that, and wish to have a special examiner. To that there can be no objection, upon the usual terms, at their request, and that will carry such consequences with regard to the costs of the special examiner as the court may think right to dictate.

Mr. PEARSON, Q.C.: I am quite willing that there should be a special examiner, and will leave the costs in your honour's hands.

The VICE-CHANCELLOR: The petition is strongly opposed, I suppose?

Mr. PEARSON: Yes.

The VICE-CHANCELLOR: Upon what grounds?

Mr. GLASSE: I have not yet gone through the affidavits.

The VICE-CHANCELLOR: Do you agree upon a special examiner?

Mr. GLASSE: Some name will be inserted in the order. I am content with the examiner of the court.

Mr. PEARSON: They have got an appointment for the 8th of August. I say the petition ought to be dismissed with costs, and it is very hard to have this petition hanging over us.

The VICE-CHANCELLOR that involves its postponement till November. The petition will stand over until the examination is concluded.

Mr. GLASSE: Yes; at the request of the respondents.

Mr. PEARSON: Perhaps your honour will allow it to stand until this day fortnight.

The VICE-CHANCELLOR: Yes.

Mr. GLASSE: If the examination is not concluded, it must stand over again.

The VICE-CHANCELLOR: Where are your witnesses?

Mr. PEARSON: They are all here, sir.

COURT OF EXCHEQUER.—GUILDHALL, SATURDAY, JULY 4.

(Before the LORD CHIEF BARON *and a Special Jury.)*

BOWLES *v.* HART

Mr. DAY, Q.C., and Mr. LUMLEY SMITH appeared for the plaintiff; Mr. M'INTYRE, Q.C., and Mr. MEADOWS WHITE for the defendant.

This was an action for libel, brought by Dr. Leeman Bowles, a surgeon, practising at Folkestone, against Mr. Richard Hart, a solicitor in the same town, and the secretary of the Folkestone Water-Works Company. The first of the libels complained of, and for which compensation was sought, was contained in an advertisement that appeared in the *Folkestone Chronicle*, and the two others contained in two subsequent letters addressed by the defendant to the editor of the same paper, charging the plaintiff with having made false and willful statements in respect to the quality of the water supplied to the inhabitants of the town by the company, knowing such statements to be untrue. The facts, as stated by the learned counsel, and proved in evidence, were these:—The late Dr. Bence Jones, when at Folkestone, complained of the water he got from a tank in his own house, supplied by the defendant's company, and the plaintiff supplied Dr. Bence Jones with some samples of water for analysis. Dr. Bence Jones, in 1871, wrote a letter to the Town Council of Folkestone, stating that during the 20 years he had lived at Folkestone in the autumn, he had never had water supplied by the company fit to drink. The water brought direct from the spring to his house had always been good. He had caused careful analyses to be made, hoping to prove what was wrong, but the most careful analysis did not show why the water was not what he would drink; but by a new method of inquiry it was made evident. The spring water was nearly as good as water could be, excepting its hardness, while the water supplied by the company was shown at the Royal Institution to be as bad as water supplied by the Grand Junction Water Company to London. His object in writing the letter, he said, was to pray the Town Council to petition for a clause to be inserted in the New Folkestone Water-Works Bill, insisting upon water as pure as it comes from the springs, and of not more than 5 degrees of hardness. The springs used by the defendant's company, it appeared, rise from chalk and green sand, and the water, being received into an upper reservoir, passes down into a lower or storeage reservoir, and from the latter it appears, on an evening in December, the plaintiff procured a sample of the water for Dr. Bence Jones, by stepping a little way into the water and throwing a bottle fastened to a string into the water, and thus filling the bottle. The plaintiff called upon the defendant respecting the state of the water, and read him several extracts from Dr. Bence Jones's letters, and the defendant said the doctor was a great quack, and the plaintiff might do his best and his worse. The plaintiff had adopted the analysis made by Dr. Frankland, the chemist sent down by Government, and upon this he made his complaints that the water supplied by the defendant's company was bad. He called upon the defendant at the office of the company, in which there was a fountain supplied by the works, and, as the defendant stated, with the object, as he then thought, of getting assistance for the Town Council to oppose their bill when the subject of the quality of the water was discussed. The defendant, pointing to the fountain, said there was the water supplied to the public, and the plaintiff might take a sample from it; but the plaintiff, as the defendant alleged, stated that it was filtered, which the defendant denied, and said that Dr. Bence Jones was always an opponent of the company, and he objected to having anything to do with him, but he would do anything he could for the plaintiff. The bill, it appeared, passed through Parliament in 1872, and an analysis was made of the water by Dr. Letheby. In 1871 a letter appeared in the *Folkestone Express*, written by Dr. Bence Jones, in which he said he had to thank Dr. Bowles (the plaintiff) for four bottles with unbroken seals from the Cherry Gardens reservoirs, from the main cisterns in Dr. Bowles's house, from Dr. Bowles's cistern, and from Dr. Bence Jones's cistern, and, after making many observations, he said that the Canterbury water, after it had been in the covered reservoirs, remained as pure as when it came from the spring, while the Folkestone water from the Cherry Gardens reservoir was as bad from dirt as the Grand Junction Thames water, which is ten times as dirty as the Canterbury drinking water, and that the water from his own and the plaintiff's cisterns was in a slight degree better than the water in the Cherry Gardens reservoir, which was altogether contrary to his expectations. After giving an account of the means he employed for testing the water, he says that in the winter the Folkestone water contains no living things, although he could not say it did not contain the seeds of living things. On March 4, 1871, the plaintiff wrote a letter to the *Folkestone Chronicle*, in which he spoke in terms of the highest eulogy of the quality of the water supplied by the Sandgate Water-Works, and the method of storing the water, and went on to say:

> Contrast this with our own Folkestone reservoir, knee-deep in dark blue mud, encumbered with weeds, living and dead, and having a large surface exposed to the air to receive the clouds of dust which are often carried by our high winds from the coast and surrounding fields, and this dust, moreover, necessarily containing particles of manure and organic cells ever ready to germinate under the favouring influence of water freely exposed to the sun and air.

Although the plaintiff ceased from writing to the papers, a correspondence had been kept up in the local papers on the subject of the water, and on 16th of November, 1872, a letter from the defendant appeared in the *Folkestone Express*, complaining that the plaintiff had been guilty of falsehood in a letter of his published in the local press in which he charged the company with a serious secret intention of doing wrong, and conveying an unjustifiable imputation not only on the company, but on the officials who were charged with the management of its affairs. On the 19th of February, 1873, at a meeting of the water-works company, a resolution was proposed. It was to the effect that Dr. Bowles had been guilty of direct falsehood in a letter published in the local press charging the company and its officers with a serious secret intention of doing wrong, and that the defendant having called attention to the falsehoods relating to the water supply published by the plaintiff, it was resolved to ask the Town Council to allow a drinking fountain to be erected on the West Cliff, and that the correspondence relating to the water supply and Mr. Bowles's statements recently published in the Folkestone papers be printed as a pamphlet. The following letter appeared on the 3rd of August, 1873, as an advertisement in the *Folkestone Chronicle*:—

(ADVERTISEMENT.)

Dr. Bowles and the Folkestone Water-Works Company.

To the Editor of the "Folkestone Chronicle."

Sir,—Mr. Robert Leman Bowles, of No. 8, West Terrace, Folkestone, a medical practitioner, some time since published a letter in the *Folkestone Local Press*, containing statements relative to the water of the company and the management of the works. The board of directors accused the said Robert Leman Bowles of deliberate falsehood in making such statements, and at a large and influential meeting of shareholders, held on the 18th of February, 1873, it was resolved—"That there is not the slightest foundation for the assertions which Mr. Robert Leman Bowles has made relative to the company and the water it supplies, and, in the opinion of the meeting, the clerk has properly and justly exposed the falsehood and misrepresentation of which Mr. Bowles has been guilty." And this resolution was publicly advertised. The said Robert Leman Bowles was subsequently, both privately and publicly, challenged to substantiate his statements or to withdraw his letter; he has never attempted to substantiate his statements, for the best of all reasons, that they cannot be substantiated, and he has never withdrawn his letter, and he thereby keeps himself in a position still to promulgate his falsehood. Complaints have reached this office, but, without exception, they come from persons who are patients of Mr. Bowles. Mr. Bowles assumes the *status* of Dr. Bowles, his authority for which is something he obtained in Brussels, after a sojourn in that city of five days, including the day of his arrival and the day of his departure. But his name does not appear in the *Medical Register* (a publication of authority) as "Dr. Bowles," or as M.D. Having regard to the facts above stated, I leave all persons, and especially visitors in the town who are not acquainted with the history of Dr. Bowles's conduct, to decide whether any representations which may proceed from Mr. Bowles relative to the water supplied to Folkestone are worthy of belief.

(Signed) RICHARD HART,
Clerk to the Folkestone Water-Works Company.

Office of the Folkestone Water-Works Company, Aug. 29, 1873.

In the *Folkestone Express* of the 6th of September, 1873, appeared the following letter from the plaintiff, together with the report of Dr. Frankland, therein referred to:—

To the Editor of the "Folkestone Express."

Sir,—In contradiction of statements contained in an advertised letter of Mr. Richard Hart in the *Folkestone Chronicle* of Aug. 30, will you do me the favour to publish the accompanying copy of a report supplied by Professor Frankland to the Local Government Board? You will see that Professor Frankland (one of the most eminent of living chemists) more than corroborates any remarks I may have made with reference to the Folkestone water as it is supplied to the consumers. It may be expected that I should take some notice of the disgraceful language used by the writer of that advertisement, a public and paid officer of the water-works company. It is indeed true that he has grossly violated the established rules of society by his personal virulence, and has disentitled himself to any consideration but that of the punishment all my friends say he so richly deserved. I have, therefore, placed the whole subject before my London solicitors, but I regard Mr. Hart's conduct as altogether secondary to the great question at issue. (Signed) ROBERT L. BOWLES, M.D., L.R.C.P.

Dr. Frankland, the Government inspector, reported upon the company's works, and said, among other things:—

> That it was of fairly good quality, and that there were not wanting visible causes sufficient to account for the deterioration of the water during its sojourn in the storeage reservoirs. There are two houses and some cow-sheds situated near to and above the storeage reservoirs, and the so-called "Cherry Gardens" near these houses are, as I was informed, to some extent a place of public resort, and there is no sufficient fence around the springs and reservoirs to prevent trespassers from gaining access to the water. On the occasion of my first visit I noticed that ducks were kept upon the reservoir, and that sheep were admitted to pasture upon the grassy banks sloping down to the water's edge. Hard water from springs and wells when exposed to sunlight is very prolific of confervoid growths, and such growths were noticed in the reservoirs on both occasions. 3. The temperature of the water entering the storeage reservoirs averaged 52·3° Fahr.; but on the 9th inst. the temperature of the water leaving them and entering the mains was 63·5° Fahr., while that being delivered in the town was no less than 65·8° Fahr. At this temperature the best water is vapid and unpalatable. 4. The sample of water taken at the office of the secretary of the water company on the 9th inst. differs very markedly in many respects from the water which was found to be entering the main at the reservoir about an hour and a half later. I am unable to offer any explanation of this difference. With reference to the complaints which, as stated in your letter, have been made to the Local Government Board about the quality of the water supplied to Folkestone, I have to say that the only defect of the water at its source is its somewhat excessive hardness; any other defects which have been noticed have arisen from the modes of storeage and distribution.

The second libel of which Dr. Bowles complained was published in the *Folkestone Chronicle*, and was written by the defendant, and Dr. Bowles had said that Dr. Frankland had corroborated his remarks with reference to the Folkestone water, and suggested in a letter written to the defendant that a concrete bottom should be placed in the reservoir. Mr. Hart, after denying that the statement (which the plaintiff swore he never made) that the water issuing from a drinking fountain in his office was or had been filtered, wrote:—

> My reputation is put in question, and my property may be injured; some men would have succumbed under such attacks as I have been subject to, for it is not merely what Mr. Bowles asserts, but what his assertions lead to, that I have to endure. Among other things, it has been thrown out at me that Mr. Bowles has "an assured position" which was beyond my reach. I had no desire to interfere with his position, for it is wholly unimportant to me that he passes himself off to his patients as "Dr. Bowles;" if it gave him, or if he thought it gave him, an advantage over his brother practitioners, it certainly did me no injury; but I was not so simple as to disregard the fact that it would be difficult for people to believe that a man who had passed an examination at one of the universities of the United Kingdom, and who had been associated with the men of honour and integrity who are to be met with there, could be guilty of any misrepresentation. The issue raised between us (and it was raised by Mr. Bowles) was whether I, a paid officer of the company, and holding several public appointments requiring honour and integrity in their management, had been guilty of secret and intentional fraud towards the public, or whether Mr. Bowles had been guilty of falsehood. He made use of his "assured position," including his doctorship, to induce a belief in his assertions, and I, as a matter of necessity, had to show that his only authority for assuming the *status* of M.D. was that which he obtained at Brussels on a residence of five days, including the day of his arrival and the day of his departure. When society, by the force of public opinion, abolished the practice of duelling, it undertook a responsibility to uphold truth against falsehood; if it fail in this, its duty, a coward may lie with impunity, and no man will be safe in his property, his family, or his reputation, and the inevitable consequence must be that the use of the pistol and the horsewhip must be revived.

The third libel appeared in the *Folkestone Chronicle*, dated the 21st of February, 1873:—

To the Editor of the "Folkestone Chronicle."

Sir,—The last paragraph of my letter to you of last week has been misunderstood, and to some extent misrepresented. A writer of eminence has observed that "a lie should be trampled on and extirpated whenever found." I am for fumigating the atmosphere when I suspect that falsehood, like pestilence, breathes around me. The mischief, the injury, the annoyance which is caused by a lie can seldom be traced, and if it cannot be traced it cannot be counteracted. It is always intended to benefit the liar, and, therefore, to injure the maligned, no matter what the magnitude of the injury done may bear in comparison with the trifling benefit which accrues to the liar. It is mostly secret, and, therefore, like a canker at the heart, the destruction is complete before the injury is known. I have myself been the subject of misrepresentation for years without being able to unmask the slanderer until he had committed himself to writing. I have had to feel the full force of Job's prayer. The consequences of a lie are so well known and felt that it would be supererogation in me to depict them. The thief is an honest man by comparison; he stands "the hazard of the die," and if he gets caught he gets punished.

The letter contained much more in the same strain.

Dr. *Letheby* and several other witnesses were called on behalf of the defendant to prove that the water was good; but

The LORD CHIEF BARON said the real question was not whether the water was good, which must be a matter of opinion, but whether Dr. Bowles had been guilty of deliberate falsehood. His lordship here received a communication from the jury, which was understood to be that they were satisfied with the evidence which had been given on the subject of water. His lordship said that Dr. Letheby's analysis would be very interesting if it were being listened to in the Royal Institution; but he considered it foreign to the issue in this case.

The *Plaintiff* stated he was a licentiate of the Royal College of Physicians of London, a member of the Royal College of Surgeons, and a licentiate of the Apothecaries Company; and that his degree as M.D. of Brussels had been conferred upon him after an examination on scientific subjects extending over a period of four days.

Mr. M'INTYRE, for the defendant, said that, even adopting the statement of

the plaintiff, founded as it was upon merely reading the report of Dr. Frankland, without giving himself the trouble to test the correctness of it, so small was the amount of organic matter contained in the water that a man would have to swallow 18 gallons of water before he would swallow one grain of organic matter. The quantity was one in a million, and Mr. M'Intyre complained of the unfair way in which the plaintiff had supplied Dr. Bence Jones with a sample of the water from the Cherry Orchard reservoir. Having, by stepping from the bank, rendered the water turbid, he dips in his bottle, and sends the water in that condition for analysis.

The LORD CHIEF BARON, in summing up the case, said it could not be explained away that in letters published, and extensively circulated, Dr. Bowles had been charged over and over again, in no doubtful terms, with deliberate falsehood. He was a member of a most honourable profession, and in the town of Folkestone, where he had worked for 15 years, he had over and over again been called a liar in plain terms. No man was bound to bear that without taking measures to protect himself. On the other hand, Mr. Hart was equally a gentleman, exercising an honourable profession in the same town. The defendant had undertaken to prove to the entire satisfaction of the jury that, in respect of the two subjects, the plaintiff had been guilty of deliberate falsehood. The first and most important question was, whether Dr. Bowles had ever distinctly or positively charged Mr. Hart with secretly filtering the water of a fountain, and then passing it off as a fair sample from the main supply. The water supply of such a town was an important public matter, and every man had a right to express his opinion in strong language about it, but at the same time was bound to abstain from making observations on the personal character of those from whom he disagreed. There was a conflict of medical or scientific testimony as to the water. The jury were to dismiss from their minds as to what was right about that. No one looking at the correspondence could fail to be impressed with the idea that there was something wrong with the water. The way in which the plaintiff took a sample was not likely to give a satisfactory specimen. It was impossible to suppose that he intentionally took an unfair sample. The plaintiff was not to be denounced as a liar because he believed in a report prepared by a man of great integrity. The discussion was originally begun by Dr. Bence Jones, of whom his lordship said he was among the most eminent chemists and physicians of the world. It was unworthy of a man in the position of Mr. Hart to talk of the slanders of Drs. Bence Jones and Bowles. The expressions used by Mr. Hart were used nearly two years after the alleged conversations about the secret filter. It might have been expected that Mr. Hart would have taken measures to repel that charge before, supposing it to have been made. His lordship did not believe that the passages quoted from the plaintiff's letters referred to any secret filter; they clearly referred to the nature of the water. After going most fully into all the facts connected with the case, his lordship left it to the jury to say whether in the statements contained in the plaintiff's letter he had been guilty of wilful and deliberate falsehood; and, secondly, whether he knowingly and wilfully stated that there was a secret filter in Hart's office.

The jury retired, and, after a short deliberation, returned into court, and stated that they found for the plaintiff on all three counts, with £1000 damages.

GREENWICH POLICE COURT.—SATURDAY, JULY 11.

(*Before Mr.* PATTESON.)

THE LEWISHAM DISTRICT BOARD OF WORKS *v.* THE CRYSTAL PALACE DISTRICT GAS COMPANY.

SULPHUR IMPURITIES IN GAS.

Mr. EDWARDS, clerk to the Lewisham District Board, appeared in support of this summons. He said the summons had been taken out against the company for supplying gas on a certain day, which, with regard to quality, was not in accordance with the provisions of the Act of Parliament. The Crystal Palace District Gas Company were incorporated by a special Act passed in the year 1858, in which Act was incorporated the Gas-Works Clauses Act, 1847. Both of these Acts were almost silent with respect to the quality of the gas to be supplied. But by the Gas-Works Clauses Act of 1871 there were special provisions in clauses 28 to 34 with respect to the testing of gas, and in clauses 36 to 38 certain penalties were provided in the event of the gas supplied by any company, subject to the provisions of the Act, not being in accordance therewith. The defendant company obtained a second special Act in 1873, in which Act the General Act of 1871 was incorporated. It also contained a special clause, which perhaps he had better read. It was as follows:—"For the purpose of the application of the Gas-Works Clauses Act, 1871, to the undertaking of the company this Act shall be deemed the special Act; and the prescribed number of sperm candles shall be 14; and the prescribed burner shall be Sugg's London Argand, No. 1, burner, consuming 5 cubic feet of gas per hour by a 6-inch by 1¾-inch glass chimney, and such gas shall not contain more than 20 grains of sulphur in any form in 100 feet of gas." That was the point upon which the present summons was issued. The clause went on to prescribe the place at which the gas should be tested, and so on. The General Act of 1871 empowered the local authority to appoint a gas examiner, and the local board of Lewisham had appointed Mr. Heisch as the gas examiner for this district. On the 27th of March last Mr. Heisch reported to the board on the quality of the gas supplied by the defendant company, and in that report he stated as the result of his examinations that the illuminating power was equal to 15·4 candles, that there was no sulphuretted hydrogen and no ammonia in the gas, but that the sulphur in other forms was equal to 49·0 grains per 100 cubic feet; and he added that this was 29 grains in excess of the maximum fixed by the Act of Parliament. He also appended this remark, that the apparatus for testing sulphur was not in accordance with the Act of 1871, incorporated in the company's Act of 1873, or the amount of sulphur present would have been considerably higher. There was some difference of opinion as to whether this was so or not, but the company had admitted that Mr. Heisch's report as to the amount of sulphur in their gas on the 27th of March was correct as stated.

Mr. PATTESON: That it was 29 grains in excess?

Mr. EDWARDS said it was admitted by them in a letter, and he believed the secretary, who was now present, would state that it was so. It was right that he (Mr. Edwards) should inform the magistrate that the company had promised to do their utmost to reduce the amount of sulphur in their gas, and that in point of fact it had been reduced considerably, for on a subsequent examination it was reported by Mr. Heisch to be now within the limits of the Act—he believed as low as 10 grains. The company had requested that the summons should be withdrawn, but the local board thought it their duty to bring the matter before the court, notwithstanding the extenuating circumstances which he had mentioned—viz., that the company were now doing all they could to comply with the Act.

Mr. MAGNUS OHREN, secretary of the company, appeared to answer the summons. He said Mr. Edwards had referred to clause 17 of the special Act, under which the company were bound to supply gas of a certain illuminating power. That clause provided that "the prescribed place (for testing the gas) shall be some place to be provided by the company for the purpose, not less than 1000 yards from the works of the company." On the passing of this Act last year, the directors of the company ordered that a testing-station should be provided, and the necessary apparatus placed therein in accordance with the statute. They ordered the sulphur apparatus from the well-known Mr. Sugg, one of the first makers in the world, and this apparatus was made under the advice of Dr. Letheby, also well known as the most competent man to give an opinion on such apparatus, and therefore they believed they had the best that could be procured. The directors had done all in their power to carry out the provisions of the Act of Parliament, and if the apparatus was not quite what Mr. Heisch might like, it was, at any rate, the best the company were able to provide on the occasion; and he might state that, on asking Dr. Letheby the question, Dr. Letheby said there was no difference between the two instruments if properly managed. It so happened that Mr. Heisch's test was the first that had been taken with the apparatus, and therefore the directors really did not know the amount of sulphur compounds in the gas. They had not arrived at the point of testing by the new apparatus themselves, and the first intimation they had that these impurities were in excess of the requirement of the Act was through the Lewisham District Board itself. So soon as the intimation was made to him, he brought the matter before the directors, and they called for a consultation with Dr. Letheby as to the best mode of arriving at the desired point. They also instructed him (Mr. Ohren) to write to the district board to say that they would do all in their power to reduce the amount of sulphur in the gas. The engineer of the company was instructed to spare no pains or expense to effect that object, and he must say that as Mr. Heisch's test was the first test taken at the new place, and with the new apparatus, he thought the company had been rather hardly dealt with in being brought before the magistrate on a summons. When he heard that it was intended to take out a summons, it was intimated that the reason for that course was that he (Mr. Ohren) had said the company were not bound by any special Act. He certainly did make the remark, but it was with reference not to the amount of sulphur compounds in their gas, but to the kind of apparatus employed in testing, there being no apparatus named in their Act. It was for that reason Dr. Letheby was consulted as to what he considered the best apparatus. On learning that his meaning had been misapprehended, he wrote to Mr. Edwards, explaining the matter, and pointing out that his explanation was fully supported by the fact of Dr. Letheby having been consulted, and the engineer being authorized to spare no expense to reduce the sulphur compounds in the gas. In that letter he requested that the summons might be withdrawn upon the company paying the expenses, and expressed a hope that the board would not proceed to harsh measures on a single examination and report of the gas examiner. He also referred to the fact that Dr. Letheby's last examination and report showed that the sulphur compounds had been reduced to a little over 12 grains. He thought under the circumstances, therefore, that the company were rather harshly dealt with, especially as at the time the letter was written the examiner appointed by the local board reported that the sulphur was then only 10·1 grains, or about half the quantity permitted by the Act. The report of their own officer, therefore, showed that the company were doing all in their power to comply with the requirements of Parliament. They had been put to great expense in doing this; but that was not a consideration with them. They had accepted a maximum of 20 grains, and they were bound by it, and they would take care that for the future this limit should not be exceeded. Mr. Edwards said the company admitted the correctness of Mr. Heisch's examination, but they did not go so far as that; they simply said they would not dispute it. Of course they had no means of checking it; the whole of the sulphur liquor was taken away, and they knew nothing about it. If it had been left, they might have tested it for themselves; but it was not, therefore they would not dispute the matter. They had done, as he said, all in their power to amend the fault, and they felt rather grieved at being brought to the court.

Mr. PATTESON (to Mr. Edwards): It seems the desired object has been effected.

Mr. EDWARDS said it had been arrived at now; but he wished to say, as regarded the report of Mr. Heisch being admitted as correct, the secretary wrote him, "I do not intend to dispute Mr. Heisch's analysis, and so far as this company are concerned we do not require Dr. Letheby's evidence." He (Mr. Edwards) informed the secretary that if any question of fact was in dispute, he should require Dr. Letheby's evidence; and, certainly, if he had known the nature of the statement which the secretary was about to make, he should have required it to rebut that statement to this extent, that the company never had a report as to the actual state of their gas. They had a scientific examiner—Dr. Letheby—who surely must have reported to the company the amount of sulphur impurities in their gas. He (Mr. Edwards) believed he could satisfy the magistrate that the company were perfectly aware that they were supplying gas contrary to the Act. If any point was to be made of this being their first offence, he should ask for an opportunity to submit some evidence on the matter.

Mr. OHREN said he could only state in reply what he stated before, that the directors were not aware of it. Dr. Letheby did not test for sulphur compounds, and no report that he was aware of ever came to the directors. The first intimation they had of these impurities being in excess was the report of Mr. Heisch.

Mr. EDWARDS asked what it was upon which Dr. Letheby reported.

Mr. OHREN said he reported upon the illuminating power, which was the most important question for the consumer. The Act of Parliament required that the illuminating power should be equal to 14 candles, and the company kept it beyond that, and always had done so. Dr. Letheby also tested for sulphuretted hydrogen. It would be a monstrous thing to have sulphuretted hydrogen in the gas, and they never did have it.

Mr. EDWARDS: If the secretary will state that the report never referred to sulphur compounds, I accept it.

Mr. OHREN: The new apparatus had never been reported upon to the directors at all. The first intimation we had was from Mr. Heisch.

Mr. EDWARDS: That is not an answer to my question.

Mr. OHREN: You stated that we knew it, and we did not know it.

Mr. EDWARDS: If you can state that from Dr. Letheby's reports the company had no means of ascertaining at any previous time the existence of sulphur compounds in excess—

Mr. OHREN: I do say that. I say no report was ever presented to our directors, or we should have reduced them.

Mr. EDWARDS: That is not an answer. The question is whether the directors were in ignorance that the gas supplied by them was not in accordance with the Act.

Mr. OHREN: I have already stated it.

Mr. PATTESON: You state you were not aware of it, and you undertake it shall not occur in future.

Mr. OHREN: Yes; we have always been careful about it.

Mr. PATTESON: The gas was supplied impure, there is no doubt; and when the company found it out, they reduced the impurity.

Mr. OHREN: Yes, and we shall take care to keep within the limits in future.

Mr. PATTESON: The summons is dismissed on payment of the costs.

Mr. EDWARDS: I hope you will give a nominal penalty. The fact is admitted. The full penalty is £20. The district board will be content with a nominal penalty under the circumstances stated by the secretary.

Mr. PATTESON: There will be a nominal penalty of 1s. and the cost of the summons.

THE LEWISHAM DISTRICT BOARD OF WORKS *v.* THE PHŒNIX GASLIGHT AND COKE COMPANY.

Mr. EDWARDS said this was a summons for a similar offence to that charged in the last case—viz., an excess of sulphur, on the 5th of May.

Mr. BESLEY, who appeared for the company, asked for an adjournment, as he had only recently been instructed. The summons was set down for hearing on the previous Saturday, and was then adjourned for the convenience of the district board. The proceedings would necessarily occupy some time.

Mr. EDWARDS thought it would not take long—it was the same offence.

Mr. BESLEY said it was all very well for the representative of the district board to say so, but he could assure the magistrate that the defence was different.

Mr. EDWARDS said he should oppose any adjournment, unless the grounds upon which it was asked were different to those stated to him. He had an admission of the facts.

Mr. BESLEY said the company were going to call witnesses, who were now abroad.

Mr. EDWARDS said he should ask the magistrate not to adjourn the case until he had stated the facts.

Mr. BESLEY said the circuit business was about to begin, and arrangements would have to be made for that matter. He should ask to have the case adjourned until the 22nd or the 24th, as it was a long question, and would take some time.

Mr. PATTESON said he was sorry to hear it.

Mr. EDWARDS said he had been informed of the nature of the defence. The only question the company proposed to raise was whether the Act of Parliament was not more honoured in the breach than in the observance, and that, he submitted, was a question which could not be raised before the magistrate.

Mr. PATTESON: They must know their defence better than you can.

Mr. EDWARDS: They have written a letter, in which they say: "We are prepared to admit the correctness of Mr. Heisch's report as to the quality of the gas on the 5th and 6th of May last." He submitted that this was the whole case.

The CLERK: So it may be, but they may have a long answer to that.

Mr. EDWARDS: Will the learned counsel state what answer they intend to make?

The CLERK: It is hardly likely. Why should they tell you?

After some further conversation, the case was adjourned till the 22nd inst.

CLERKENWELL POLICE COURT.—THURSDAY, JULY 9.
(*Before Mr.* COOKE.)

VINT *v.* THE GASLIGHT AND COKE COMPANY.

In this case a summons had been issued against the defendants for wilfully failing to furnish the complainant with a supply of gas after being duly required to do so.

Mr. HICKLIN appeared for the complainant, and Mr. BESLEY for the defendants.

The case, as stated for the complainant, who is a publican, was that he had been supplied with gas by the gas company for some eight or nine years, having made a deposit of £3 as security for gas to be supplied. In the quarter ending Lady-day, 1873, finding the bill for gas largely in excess of the same quarter of the previous year, he applied to the company to examine the meter, and they, having done so, took away the meter and gave him a new one. The complainant, thinking this an admission that it was the fault of the company's meter, and that he had not consumed the gas, refused to pay the excess, £1 8s. 3d.; and, although the same was on each succeeding quarter carried into the quarter's account as a balance due and unpaid, he never paid it, nor did the company enforce the payment until, on June 4 last, they gave him notice that, unless by the 10th the balance was paid, they should cut off the supply of gas on the 12th, and they accordingly did so. The complainant contended that the gas was improperly cut off, inasmuch as there would not be any sum due from him to the company if they had done as they were entitled to do—viz., give him credit for the £3 held as security, and applied the same to the payment of that balance. The counsel for the defendant, among other things, contended that such a security could not be so applied.

Mr. COOKE said there was no doubt under the 16th section of the 10 & 11 Vict. cap. 15, the company had a right to cut off the gas after giving three days notice of their intention to do so, if there were any arrears of gas-rates. But were there any arrears in this case? He thought that it was admitted up to Lady-day, 1874, there was in arrear only this disputed amount, £1 8s. 3d., but the company had taken, under the 15th section of the 23 & 24 Vict., cap. 125, £3 deposit as security for the payment of any rate that might be unpaid, and it was their duty to have applied so much of that deposit as would cover their claim on the complainant, and then, if necessary, they might have proceeded under the 17th section to get a further deposit if they required it. Upon the second point raised by the company, he considered that the letter of the attorney was sufficient notice calling on the company to continue the supply. The company had verbal notice from their customer immediately after the gas had been cut off, but they seemed to have entirely disregarded it, and, in his opinion, acted in a very arbitrary and improper manner. He should fine the company the full penalty of 40s. for each day, and allow four guineas costs, in addition to the two guineas already paid by them to the complainant.

Mr. BESLEY asked the magistrate to grant a case for the opinion of the court above.

Mr. COOKE granted a case upon the points of law raised.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Dr. Letheby, the chief gas examiner for the metropolis, has recently reported to the Metropolitan Board of Works and the Corporation of London, the results of the daily testings of the gas supplied to the metropolis, by the Chartered, the Imperial, and the South Metropolitan Gas Companies during the months of April, May, and June last, from which it appears that the *illuminating power* of the gas at the several testing-places was as follows:—

Illuminating Power in Standard Sperm Candles.

	Company, Kind of Gas, and Testing-Place.	Max.		Min.		Aver.
Imp. Chartered Con. Company.	Common gas, Beckton	18·3	...	16·6	...	17·39
	,, Cannon Street	17·6	...	16·0	...	16·95
	,, Friendly Place	17·9	...	16·1	...	17·08
	Cannel gas, Millbank Street	23·4	...	20·0	...	21·27
	,, Ladbroke Grove	23·0	...	20·3	...	21·62
	Common gas, Carlyle Square	17·8	...	15·6	...	16·77
	,, Camden Street	17·2	...	14·5	...	15·82
	,, Graham Road	19·9	...	15·4	...	17·76
South Metropolitan Company, Hill Street		17·4	...	15·3	...	16·53

From which it appears that the illuminating power of gas at each of the testing-places has been fully equal to the requirements of the Acts of Parliament. As regards *purity*, Dr. Letheby reports that the gas of all the companies has been constantly free from sulphuretted hydrogen, and that the amount of sulphur in other forms than this has been as follows:—

Grains of Sulphur per 100 *Cubic Feet of Gas.*

	Company, Kind of Gas, and Testing-Place.	Max.		Min.		Aver.
Imp. Chartered Con. Company.	Common gas, Beckton	15·4	...	8·0	...	10·69
	,, Cannon Street	13·5	...	8·2	...	10·74
	,, Friendly Place	18·5	...	4·4	...	8·87
	Cannel gas, Millbank Street	23·8	...	15·1	...	18·79
	,, Ladbroke Grove	20·2	...	13·7	...	17·58
	Common gas, Carlyle Square	23·5	...	16·5	...	20·32
	,, Camden Street	22·2	...	9·9	...	15·93
	,, Graham Road	23·3	...	10·2	...	18·48
South Metropolitan Company, Hill Street		29·2	...	8·3	...	18·26

Excepting, therefore, the South Metropolitan gas, the gas of all the companies has been less charged with sulphur than is required by the referees. On ten occasions the gas of the South Metropolitan Company has been overcharged with this impurity, but the chief gas examiner reports that it was caused by unavoidable accident. The amount of ammonia in the gas has never exceeded the prescribed quantity of 2·5 grains per 100 cubic feet, the average amounts being in most cases below 1 grain per 100 feet.

METROPOLITAN BOARD OF WORKS.—At the meeting of the board on Friday last, the Works and General Purposes Committee made a report recommending that Mr. G. W. Wood be appointed at a salary of £100 per annum, and subject to the usual conditions, as gas examiner at the new testing-station fitted up by the Imperial Gas Company in Devons Road, Bow. The recommendation was, however, referred again to the committee for further consideration, it being stated, by the chairman of the committee, that Mr. Wood was a clerk in the accountant's department, and there was, at present, no intention to remove him from that office.

BERMONDSEY.—A meeting was held in the vestry-hall on Wednesday last, "to take into consideration the best way of reducing the price of gas." Mr. Locke, Q.C., M.P., presided, and in opening the proceedings said the question was not new to him, as he had been a member of many parliamentary committees appointed to inquire into it, but he had never been able to have his own way in the matter. He had always found that, by some means or other, the gas companies were put in such a position that very little change was made in regard to the manner in which they carried on their business, and certainly there had been no diminution of price. The gas question had become an extremely difficult one. None of the plans laid down had been of any service in diminishing the price of gas. It had been proposed, as a means of reducing the price of gas, to establish competition between the companies. But that had not effected any good, as, instead of competition there had been coalition. The companies had worked together, and so had raised the price. He might dilate upon many subjects connected with this question, but he would just say that the last committee of which he was a member made a report, which was considered unsatisfactory, and Mr. Ayrton made the rather extraordinary proposal that he (Mr. Locke) should appear before the committee on the part of the consumers, and that a gentleman from the north, much more skilled in the matter than he was, should fight the battle of the companies. They did fight, but he got very little out of it, as he could not get the companies to do what he wanted. With regard to the present meeting, he would say that he came there as a learner, but whatever resolution was passed, he would be pleased to lay before the House of Commons. A resolution was then adopted, on the motion of Mr. Haynes, seconded by Mr. Taunton—"That this meeting is of opinion that gas consumers are prejudicially affected by the powers conferred by Parliament on the metropolitan gas companies, through which the consumers pay for careless and unskilful management without sufficient means of redress." Mr. Norwood Earle submitted to the meeting a plan which the "South London Gas Defence Association" wished to lay before Parliament and the country as a remedy for the grievances complained of. The plan was that the Government should bring in a bill, entitled the Gas Regulation Bill, which should deal with all the metropolitan companies, and that it should be administered in the same way as the Railway Regulation Act, by commissioners, before whom the consumers could appear. Mr. A. Dunn moved, and Mr. Kimber seconded, the following proposition, which was agreed to—"That inasmuch as this meeting is of opinion that it is not desirable for Government to purchase the metropolitan gas companies, nor for the local authorities to become gas makers, that the plan now recommended, and which was submitted recently to the President of the Board of Trade, is calculated equitably and fairly to remedy the grievances complained of." It was resolved that a copy of this resolution be sent to Sir Charles Adderley. The chairman, in acknowledging a vote of thanks at the close of the proceedings, expressed his full concurrence with what had been advanced. Mr. Earle's plan was a sound and just one, simply upon the ground that the gas companies now had a monopoly. The public had a right to ask for an inquiry into the way in which they conducted their business. He was sure that Sir Charles Adderley would give the subject his best consideration. It would be quite impossible for a single individual to carry a bill of that description without the sanction of the Government, and whether they would appoint another committee, or be satisfied with the proposal now made, it was for them to say. As far as he himself was concerned, he would do all in his power to help the matter forward, and to assure a remedy for the evil complained of.

DELEGATE MEETING IN ST. PANCRAS.—The third meeting of delegates from various vestries and local boards was held on the 7th inst.—Mr. Hoppey in the chair. The previous meeting adjourned without coming to any decision upon a motion to the effect—"That the Metropolitan Board of Works be requested to obtain from Government power to examine and inquire fully into the mode in which the gas companies have raised and expended their capital." The chairman opened the business of the present meeting by advising the delegates to appoint a committee to debate the details of the question, as in the present state of affairs a number of individuals proposed a number of motions which, if not carried, caused them annoyance and disappointment. If they went on without a committee they would be in imminent risk of breaking down, and thus of incurring the derision of the gas companies and the public. Mr. Cufflin also warned them that the conference would not bring matters to a head if they went on "tinkering this question up." They must make themselves independent of the gas companies, and, if necessary, manufacture their own gas. Mr. Westacott said it was very satisfactory to know that since their last meeting the Metropolitan Board of Works had determined to consider this question in detail, thus anticipating their request. He therefore moved as an amendment that the conference adjourn until the Metropolitan Board of Works had arrived at a decision in the matter. Mr. Bate seconded the amendment, being of opinion that the real business of the conference was concluded at the last meeting. It would be disrespectful to the Metropolitan Board to ask them to consider the question, and then to dictate to them the mode in which they should proceed. After a short discussion, the amendment was put and carried. A motion was made by Mr. Firth to the effect—"That the President of the Board of Trade be invited to receive a deputation to urge him to introduce a measure to secure uniformity of gas legislation for the metropolis. That the conference is of opinion the Metropolitan Board should be invited to introduce a competing scheme, as recommended by Mr. Cardwell's committee, providing for the purchase of the works of existing companies, with reservation of rights to purchase only mains, and to contract for gas supply. That failing the assent of the Board of Trade and Metropolitan Board to either of these suggestions, the vestries be invited to introduce a measure to establish a gas board for London, with power to acquire existing works, or to establish gas-works. That any measures for purchase should be on the terms of valuation only, and that commissioners be appointed to assess the amount to be paid for the extinction of any existing rights of supply." Only three delegates voted for this proposition, and it was therefore lost; as was also a proposition by Mr. Cufflin in favour of parochial authorities manufacturing their own gas. The conference then adjourned *sine die*, the labours of the delegates thus far having resulted in nothing.

METROPOLIS WATER SUPPLY.

BERMONDSEY VESTRY.—At the meeting, on the 6th inst., the medical officer, Dr. Parker, reported that there was a great dearth of water throughout the parish, as usual at this period of the year. The Southwark and Vauxhall Water Company appeared to be unable to give a proper supply. The pressure in the

mains was at times so low that the least obstruction or defect in the fittings was made apparent, where at other times it would not have been noticed. Much of the water was used for watering the streets of the adjoining parishes, which was objectionable when it was badly wanted for domestic purposes. He had heard that even those who had their water by meter did not get so much as they required in the day, but they had the supply principally at night-time. It was resolved to send a copy of the report to the water company.

LONDON BRIDGE WATER-WORKS ANNUITIES.—At the Auction Mart, on Wednesday last, 274 London Bridge Water-Works Annuities, secured by the New River Company, each producing £2 10s. per annum for a term of 208 years, were submitted for sale. The average price was £53 each annuity, the total amount realized being £16,020. The London Bridge Water-Works were constructed in the year 1580 by a Dutchman, who secured a lease from the Corporation of London for 500 years, prior to which, time the City had been supplied with water by fountains and wells, or dipped from the banks of the river. These works were considerably enlarged in 1701, when engines were erected in the Thames, water-wheels having previously been used; and, two years later, a company or co-partnership was formed, the duty of supplying the metropolis having previously been in the hands of representatives of the original promoter. Subsequently the flow of the Thames was seriously impeded, and the navigation through the central arch endangered by the blocking up of the other arches, and it was then arranged between the Corporation of the City of London and the London Bridge Water-Works proprietors that the works should be removed, and the district supplied thenceforth by the New River Company, who undertook to pay the proprietors their then dividend of £2 10s. per share as an annuity for the 260 years unexpired in the original lease. An Act of Parliament was obtained in 1822 to give effect to this arrangement, and the result has been satisfactory to all parties, as proved by the sale above referred to. At the same time were submitted ten new shares of £100 each in the New River Company, £40 per share being paid, and these realized £100 per share, being equal to a premium of £150 per cent.

BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from page* 20.)

WEDNESDAY AFTERNOON, JUNE 10.

Mr. G. D. MALAM (Halifax) read the following paper on

RETENTION OF NAPHTHALINE IN COAL GAS—AN EFFICACIOUS METHOD FOR DEALING WITH IT.

At our meeting held in this room in the year 1868, the late Mr. James Sharp (as many of you will remember) introduced to our notice a paper on the deposit of naphthaline in service-pipes and mains. In that paper he pathetically expressed his inability successfully to cope with the naphthaline nuisance, and stated, moreover, that when he called upon the late Mr. Lowe to supply him with a remedy, this very consolatory statement was launched out at him: "I wish I could suggest a cure for you; I should be a clever fellow to do so. We supply Buckingham Palace through two 4-inch pipes; one of these is continually becoming choked with naphthaline, while the other remains free. I cannot tell how it is, it is so arbitrary in its formation."

On the discussion of Mr. Sharp's paper, certain suggestions were thrown out, such as prolonging the contact of the gas with the newly precipitating tar and liquor, condensing slowly, and employing large or powerful apparatus for condensation.

I tried these various remedies, and increased the washing power to the extent of 10 gallons and upwards per 1000 cubic feet manufactured; and yet, upon certain conditions of the atmosphere, 20 per cent. of the public lamps would occasionally be returned as deficient from naphthaline, whilst the mains, service-pipes, and meters were continually getting stopped up, creating, as a matter of course, great annoyance, not only to the gas consumers, but to myself also.

The next step I took to solve my difficulties was to run naphtha continuously into the leading mains, but this apparently did little good.

One of the last experiments, however, that I made, and which has been carried on periodically for the past four years, has thoroughly succeeded; and it is this: When the lime and oxide purifiers are being recharged with fresh materials, I have crude or refined naphtha sprinkled over each layer or stratum of lime and oxide, and the result following this practice is that, no matter how much the gas may be impregnated with naphthaline when leaving the scrubbers, it cannot then, after it had passed, as it were, through a succession of naphtha gauntlets, retain any of that impurity in it, as is proved by the fact that there are now no deposits of naphthaline in the mains, services, lamp-taps, or meters.

The happy result thus obtained at a nominal cost by the use of naphtha prevented a considerable outlay upon extension for washers and other apparatus, the plans for which I had previously had directions to prepare, and which were all finished just at the time I discovered the above mode for getting out of what had been for years a very serious embarrassment to the managers of the Halifax Gas-Works.

To those who have to plunge the inlets of their gasholders, or are plagued with partial stoppages of the inlets and outlets of their station-meters, I recommend my practice to their notice as an infallible remedy for such troublesome occurrences.

Mr. JAMES WATSON (Sydenham) read the following paper on

CONDENSATION, AND ITS EFFECTS IN THE RETENTION OF NAPHTHALINE.

I need hardly advert to the fact that condensation in gas manufacture is of the utmost moment to those engaged in this branch of industry, inasmuch as we find that by excessive condensation we can deprive the gas of valuable illuminants necessitating the use of a certain per centage of cannel, to restore to the gas its natural illuminating power; thus a really earnest desire to secure thorough condensation may result in serious injury to the lighting power of the gas, and be a source of great expense to the manufacturer. On the other hand, deficient or imperfect condensation may give rise to imperfect and expensive purification. What this happy medium is I feel assured that there will be a great diversity of opinion, and the object of this paper is not to show what that happy medium is, but rather to show that naphthaline can and is being deposited in a solid form in the process of condensation used at many works, and that with proper care it can be retained in the gas in the shape of vapour, and delivered at the consumer's burner as a valuable light-giving constituent. Naphthaline, in the solid form, is a source of serious annoyance to consumers, owing to the frequent stoppages in service-pipes, and is likewise a source of serious expense to companies in making up the loss in illuminating power caused by its abstraction, and in clearing out stoppages in mains and services. Condensation begins with the birth of the gas, and ought to end at the inlets of scrubbers or washers, and the process should be so slow and gradual that the temperature at those points should not be more or less than 60° to 70° Fahr. The terms "slow" and "gradual" may be construed to mean many things, but practically I take them to mean that at no point between the hydraulic main and the inlets of washers and scrubbers should there be a noticeable fall in temperature. Naphthaline is only produced when carbonizing at high temperatures, and is only deposited when the gas is subjected to a sudden fall in temperature between the points already adverted to.

An apparent difficulty may arise in the minds of some engineers and managers as to how to obtain this evenness of temperature during the prevalence of severe frost. This I manage by cutting off such an amount of condensing power as to secure the required result, having thermometers inserted in the mains at (say) 12 or 15 points, so that the required temperature can be worked to within a range of 5° Fahr. On the other hand, there is the summer heat to contend with; and where the condenser or condensing mains are exposed to the sun's action, I paint them pure white, to lessen the absorption of solar heat, and with the most encouraging results. My acquaintance with naphthaline began when I came to the south, 14 years ago; and, with Newcastle coal and high heats, naphthaline was formed in such abundance that the inlets and outlets of holders became choked up, to say nothing of district mains and services. Being in great difficulty, I laid on steam-pipes, and endeavoured to dissolve the naphthaline, and pump it up with the condensed steam. This seemed to meet my case, but the ¾-inch suction-pipes of the pumps became choked, and were enlarged to 1¼ inch with the same result; and the continued applications of steam caused the naphthaline to run together, and defied the action of steam, so that I was obliged to take off the man lids, and resort to plunging the pipes with cold water—a process doubtless well known to you.

I beg to add here that the application of heat from time to time had the effect of expanding the lead joints of the pipes in the inside of the tank, causing them to leak in water, thus necessitating frequent pumping of the syphons. About this time a new retort-house was built, and the gas had to be conveyed some little distance, to bring it into connexion with the other portions of the works. The pipe was suspended by brackets in the inside and outside of the house. The tar and ammoniacal liquor were allowed to flow with the gas until it arrived at the condenser, and from that day to this I have had little or no trouble with naphthaline. The results were so marvellous that in the old retort-house of the same works a pipe was hung inside and outside of the house, the tar and ammoniacal liquor flowing with the gas, and with the best results. This system, which has been very generally adopted by engineers and managers, was much sneered at by metropolitan engineers, but those who sneered most were the first to adopt it, and the rest is well known to you. It is not the object of the writer to enter into the chemistry of this matter, he would rather leave that for chemical experts, but would just say that naphthaline should be kept in a state of vapour by evenness of temperature, by being kept in contact with coal tar, until it is thoroughly cooled by means of a long condensing main. Some five years ago this system was adopted at the Crystal Palace District Gas-Works, and a good sum of money was paid for the information, it being considered quite new at that time. In addition to these long lines of condensing main, what is termed a battery condenser was erected to take out the remaining naphthaline, the aforesaid condensing main being evidently insufficient in length and power; the results of this battery condenser were that it did not take out the naphthaline, but led to its deposition in larger quantities, to the manifest injury of the gas, leading to the use of 8 or 10 per cent. of cannel. On investigation, I was led to believe that this arose from undue and rapid condensation, and began to decrease it by stopping up the tubes, and eventually, in cold weather, by passing the condenser altogether, and thus suiting the condensation to the make of gas. I have not had one stoppage in the works, nor have I had to remove a man-lid from a holder during the last two years, although these things were quite common previous to my becoming engineer of these works. With reference to the district, with, say, 7000 consumers, and a make of 300 million per annum, our complaints from this cause average, say, one or two per day. With reference to the heat in carbonizing, I would just say that we are "paid" for nearly 9000 cubic feet per ton carbonized, that the consumption of cannel is 2 per cent. only, the illuminating power is 15 candles, taken at a point over 2 miles from the works, perfect freedom from ammonia and sulphur compounds being under 20 grains per 100 cubic feet, in accordance with the parliamentary obligations of my company. With reference to the depositions of naphthaline, there are certain phenomena which I could never account for. At a village five miles from the point of supply, and with, say, 120 consumers in the village, naphthaline only manifested itself to one consumer, and that was every month or so. The naphthaline in question was always found in the plug of the 1¼-inch main-cock, which was simply blown out by the breath, and there was an end of it for a time. I have endeavoured to account for it by supposing, as the consumer in question was the largest in the village, the greater draught on his service gave him the benefit of the naphthaline. I have noticed also that coal that has been exposed to the action of the weather yielded naphthaline more readily than coal that was fresh and dry. The richer the coal the less naphthaline appears to be deposited. Thus with cannel gas it is never met with, and in my experience as engineer of the British Gaslight Company, at Hull, in carbonizing upwards of 40,000 tons of Yorkshire coal, I do not remember to have seen a trace of this substance. I do not pretend to account for this; but the facts remain. This substance should not be regarded as an impurity but an illuminant, which ought to go to the consumer's burner; and in view of the increasing scarcity and high price of cannel, we are warranted in using all the means in our power to retain in the gas every portion of its illuminating properties.

This is an interesting subject and could easily be enlarged upon, but the object of these remarks is to provoke a useful discussion rather than go into the *minutiæ* of the question.

The discussion of the two papers just read was then taken.

Mr. MANNING (Hythe) asked Mr. Malam the quantity of naphtha he used, and the cost.

Mr. ELDRIDGE (Richmond) said he did not know what the experience of others might be, but he might remark that, about ten or twelve years ago, when he was making gas of some 12-candle illuminating power, every two or three months he was obliged to steam out or plunge the inlets and outlets. His company were afterwards called upon to supply gas of a higher illuminating power—about 16 candles—and from that time he had never seen a particle of naphthaline. This, he thought, went to prove that it was simply a question of the richness of the gas rather than of any mechanical arrangement.

Mr. G. ANDERSON (London) believed that to bring naphtha vapour in contact with naphthaline was the best way to get rid of the latter. He had a case some years ago in which the leading main from the works became stopped with naphthaline. To remedy the evil, he had a boiler with water to make steam and pumped the syphons, but he found, in the course of a month, the stoppage was as bad as ever. He thereupon caused naphtha to be pumped into the boiler, so that the vapour of that spirit went along the main, and was pumped out at the syphons, and allowed to separate from the water, so that the naphtha could be used over again. This was a very good way to get rid of the evil, but he thought they ought to try and prevent it. A great deal, as Mr. Eldridge remarked, depended upon making weak gas. At the time to which he (Mr. Anderson) alluded they were making over 10,000 cubic feet per ton—the manager thought the more the better—and, as he told him, he ought to be satisfied with 9500. If there were more carbon in the gas there would be less chance of the formation of naphthaline. But the deposition did not entirely depend upon that. He had seen gas-works in which a deposit of naphthaline was found in one gasholder and not in another. At his own house he had a service which got choked in winter. He made it his business to see it stripped down to the main, and would not allow the men to knock it, but made them lift it out carefully. On examination, it was found that the only chokeage with naphthaline was one-eighth of an inch in diameter, at a part where there was a burr on the pipe. In one case that came under his notice the inlet of the holder was choked with naphthaline. The inlet went down into the ground, and at a certain level there was water. When the cap was taken off to plunge the pipe, it was found that the deposition began exactly at the water's edge, and the pipe was clean down to that point. The deposition, therefore, depended upon two considerations in addition to the question of the quality of the gas. It depended first upon the resistance which was offered to the passage of the gas, as in the

case of the burr; and, secondly, upon temperature. A sudden change, as in the case of the pipe entering the water, was apt to cause a deposit. If managers were content to have a little less gas made per ton of coal, they would, in many instances, be free from the annoyance of naphthaline. Again, if they had easy bends, and were careful not to change the temperature too suddenly, they would do much to prevent its formation.

Mr. CRAVEN (Dewsbury) said he had tried a somewhat similar remedy to that recommended by Mr. Malam, and with the same result. About four years ago he had much trouble at Dewsbury with naphthaline. It was the first time it had occurred for 13 years, and he could not understand it except that it might be caused by the weather, which at the time was exceedingly hot, and the condensers were not doing their work very well. After thinking over the matter, it struck him to put a little naphtha into the exhauster every day. He did so, and from that moment to the present he had never had the slightest trouble in the matter.

Mr. WARNER (South Shields) thought that he pointed out in his paper on condensers, read before the association three or four years ago, the importance of having complete control over the condensation of the gas. He stated that he placed before the condensers one of his scrubbers, with wood trays, and he might now add that, with the control he had over the temperature by shutting off a portion of the condensers, and by covering them in, and also by using the ammoniacal liquor, and so producing a slow condensation of the gas, he never had any stoppages at all, except it might be a little occasionally in winter. He thought it was pretty well known that if the temperature was controlled, the evil might be got rid of.

Mr. IRONS (Gosport) said his impression was that the deposit of naphthaline arose entirely from chemical action, set in motion by a variety of causes. He was troubled with it at one time, and tried to get rid of the evil by steam, but the effect, where there was a large mass, was to convert it into a hard substance. He had tried naphtha, but it did not act with sufficient rapidity when there was a large quantity of gas. His present plan was to dissolve it with hot water. Where a sudden change of temperature took place, as where a pipe came in contact with water, that was the spot where the deposit was found.

Mr. MALAM, in answer to Mr. Manning, said the cost of the naphtha was something like ·12d. per 1000 cubic feet. He had known an instance in which 300 lamps out of 1500 had gone out upon a heavy shower coming on after a tolerably warm day. It was said by one speaker that naphthaline was only found where poor gas was being made, but he did not agree in the remark, as he had known the lamps returned as deficient while the official tester was returning the illuminating power of the gas as something like 21 candles. He had endeavoured to keep the lamps in by increasing the illuminating power. Nevertheless, when a sudden shower of rain came on after a warm day, the lamps would be just as bad as ever. It was not, therefore, altogether a question of raising the quality of the gas. At the same time he agreed in a great deal that Mr. Anderson had said. He had tried the various suggestions made during the discussion of this subject in 1868, but with only moderate success; they did not altogether meet his difficulties. At last it struck him that if naphtha was sprinkled over each of the layers of his purifiers, so that every particle of gas came in contact with it, he should get rid of this troublesome impurity, and ever since he had tried it he had found entire relief therefrom.

The PRESIDENT: What is the area of each purifier?

Mr. MALAM: Twenty feet square.

The PRESIDENT: And how much naphtha on each?

Mr. MALAM: A few gallons—about 8 gallons per surface of 400 square feet. That is the maximum.

The PRESIDENT: One gallon to 50 feet of surface?

Mr. MALAM: Yes.

Mr. WATSON said the aim of his paper was not to recommend any means such as naphtha or steam, or other agency, to get rid of the nuisance. He had dealt rather with the evil at its root. He thought the best plan was to prevent its formation, and he believed he was the first, in a practical way, to do it. About 14 years ago, he put up the first long condenser main, which had been found beneficial and effective. With reference to Mr. Eldridge's observation that with 14 or 16 candle gas they would not be troubled with naphthaline, he remarked that there was no doubt cannel had the effect of holding this substance in a state of vapour. But why use cannel to put back into the gas that which should never have been taken out of it? He agreed in the remark that had been made as to the point where naphthaline was usually found. He found, for example, that on a bridge, where there was cold above and below, the pipes would frequently get choked up; also at the water-line, which proved what he stated in his paper that the deposit was owing to sudden change of temperature. Let gas managers avoid this as much as possible, and use such an amount of bye-passing in condensing that the temperature may be kept to within about 5 degrees of that of the air, they would then have no naphthaline to contend with. In the present day, when so much was being paid for coal, and cannel was getting rare, so that they might almost be said to see the beginning of the end, they ought to try to dispense with the use of the latter, and the sooner they did it the better.

The PRESIDENT remarked, in reference to an observation of the last speaker that there might be a question as to the period when the long condensing main was introduced. He thought it had been in use more than 14 years.

Mr. METHVEN said considerably before that it was in use at the works of the Imperial Company.

The PRESIDENT thought, from what had been stated in the papers and from the discussion, there ought to be no doubt whatever about the question of naphthaline, and that no manager ought ever to be troubled with it, so far as knowledge on the subject went. But it was a question which depended upon the practical application of that knowledge. Naphthaline, like other things, did not always act in accordance with the received theories respecting it, for sometimes when managers thought that all the circumstances were favourable to its absence, it made its appearance in an unexpected and unpleasant manner. There was a great deal in what was stated by Mr. Anderson about the effect of roughness of surface in pipes. He (the president) had a small pipe which passed outside a wall to supply gas to heat a greenhouse. Every night in winter he had to wash out that pipe by filling it with hot water. At last he adopted this expedient: after he had nearly filled up the pipe with hot water to dissolve out the naphthaline, he poured in a little sweet oil; the water was then let out, and the sweet oil coated the pipe with a thin film, and since that period there had been no deposit of naphthaline in it. This seemed to indicate the correctness of the remark about the importance of having smooth surfaces as much as possible. When once crystallization was set up it went on rapidly, and though by blowing out the naphthaline the pipe was cleaned so as to renew the passage of the gas, there would still be some particles of naphthaline adhering, and the process of crystallization was again set up, so that in a few days there was another stopped service. No doubt what Mr. Watson remarked was the true process to be adopted—slow and gradual condensation. This caused the hydrocarbon of which the naphthaline consisted to go on and improve the gas, instead of annoying the consumers.

Mr. HODGSON JONES (London) read the following paper on

VINCENT'S PATENT GRATINGS APPLIED TO GAS-RETORTS.

The writer's attention was drawn to this patent about nine months ago, when he was requested to conduct some experiments on a small scale.

This, however, he declined; but agreed, if tried with the ordinary retorts and apparatus of a gas-work.

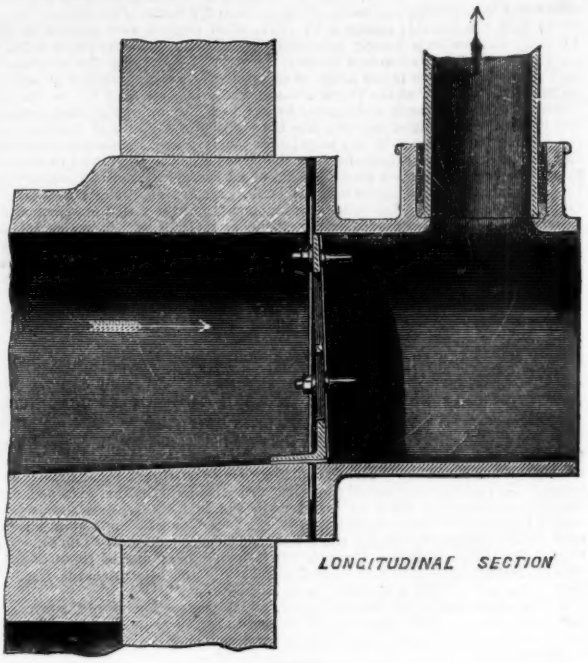
By the kindness of Mr. A. Wood he was enabled to do so, and the gratings were in action at the Hastings Gas-Works from Sept. 17 to Nov. 5 last.

The writer has also had them working in France since the beginning of last November.

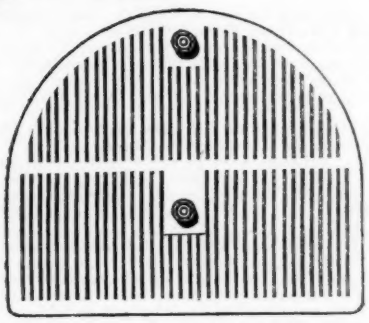
The specification of this patent describes also a safety-cock, provided with an outlet-pipe for permitting the escape of gas into the air, or a communication with the atmosphere and the retort when out of action, which does away with the necessity of dip-pipes, and describes gratings in either the ascension-pipe or mouthpiece. The specification claims the oval stand-pipe and mouthpiece attached to the retort immediately in front of the furnace, and provided with the gratings and the cock as set forth above.

It will be seen by the diagrams that the gratings are so placed that all the gas generated passes through them.

The cock, which is a three-way one, isolates the retort connected with it from the rest of the retorts and apparatus, and in addition permits of any portion of the charge escaping into the air.



LONGITUDINAL SECTION



The drawings show a longitudinal section and elevation of an ordinary mouthpiece, furnished with a grating consisting of two sheets of wrought iron, with long narrow apertures, having a gas way of one-third more than the area of a 6-inch diameter ascension-pipe the size usually used by the writer. The ascension-pipe tapers to 4 inches at top.

In the joint between mouthpiece and retort, round sides and top, a wrought-iron plate is fixed, projecting half an inch; this forms a stop for the grating to butt against.

The charge being made with a scoop, it is levelled and pushed back about 18 inches from the mouthpiece, and the gratings are placed into the back end of mouthpiece, the retort-lid being then closed.

Should, however, the ascension-pipes be foul, they should be cleaned before using the gratings by means of another grating, which will be fouled, and therefore unfit for any but that service, as the effect is to unstop the pipes and cause the tar, &c., to fall down into the mouthpiece. When this is once done, the ascension-pipes will, if the gratings are continued to be used, remain perfectly clean, and the gratings will simply receive at each operation a coating of fine carbon, through which the gas passes before escaping into the ascension-pipe.

When the gratings are withdrawn from the retorts, they are brushed with a hard broom, and afterwards with a steel wire brush, on each side, and, if necessary, scraped with a knife.

They are easier cleaned whilst hot than if left to cool.

It is found that the gas-way during the carbonization of the coal in the retort is so reduced by the thicker deposition of the soot as to be in proportion to the smaller quantity of gas passed during the latter part of the charge.

The effect of passing the gas through this minutely divided carbon is to reduce its temperature at that point, thus enabling the retorts to be worked to a white heat without the inconvenience of stopped pipes and the formation of naphthaline.

In the opinion of the writer there is a decided advantage in reducing the temperature of the gas generated as it issues from the retort to as low a point as is practicable before it reaches the ascension-pipe, after which he prefers to reduce the temperature gradually (before attempting the purification) to such a point that, if the apparatus be properly proportioned, the temperature will rest constant from the outlet of the condensers to the inlets of the gas-holders, notwithstanding the chemical combinations that are effected in the process of purification.

It also seems from the experiments that some of the bisulphide of carbon and sulpho-hydrocarbons are converted into sulphuretted hydrogen in passing through the heated iron of the gratings coated with the carbon, which enables from two to three grains additional of the fixed sulphur per 100 feet of gas to be removed by the subsequent purification.

The writer concludes these few remarks by observing that he believes this system to be an improvement over the present one, a greater quantity of a richer gas being produced from any given coals, the bulk of tar remaining about the same; the higher heats used not affecting the wear and tear, being confined to the furnace lining.

He is aware that this idea of slightly retarding the free escape of the gas, as generated from the retorts is against the generally received notion, which has originated in consequence of the deposition of carbon in the retorts before exhausters were employed, and when dip-pipes were used with deep seals.

Mr. THOMAS (Alton) asked whether there was any difficulty in removing and replacing the gratings after they had been in use for a short time.

Mr. CRAVEN (Dewsbury) inquired what was the cost per mouthpiece of fitting up the new arrangement. His own idea was that if the mouthpiece were only made a little longer in the casting, so as to take the ascension-pipe a greater distance from the retort, there would be no necessity for the grating.

Mr. BROADBERRY (Southend) said some years ago he was much troubled with stopped pipes, the cause of which he attributed to the ascension-pipes being so near the brickwork. Not being prepared to put entirely new mouthpieces, he thought he would try a 14-inch wall in front, instead of a 9-inch, to keep the heats back. Since that was done he had never known what it was to have a stopped pipe.

Mr. WOOD (Hastings) said he had watched Mr. Vincent's process, to the best of his ability, for two months. His first idea was that it would cause a back pressure upon the retorts, but that had not proved to be the case; there was no pressure produced whatever. He had tested for bisulphide of carbon right through, and the whole of his experiments showed three grains less than the average over the same space of time and with the same coal. He found the illuminating power was about the same; the quantity of gas produced very similar—if anything a little more, which was another proof that there was no great pressure upon the retorts. But the great advantage in the grating was that it altogether did away with stopped pipes. Since he discontinued the process he had been two or three times troubled with them, but during the time it was in operation he had no stopped pipes for weeks together.

Mr. D. BRUCE PEEBLES (Edinburgh) said he thought this was a very valuable invention, but he was in an unfortunate position in having to speak of another apparatus when mentioning this one. The theory of the action of these gratings was very similar to that on which Messrs. Pélouze and Audouin's invention was based. He thought the term "condenser," as applied to the latter, was a misnomer, and that if the term "filter," or "strainer," or "separater," had been employed, it would have been understood better. He saw the apparatus of Messrs. Pélouze and Audouin in action lately at the Leith Gas-Works, and was certainly surprised at the easy way in which it separated the tar from the gas. It seemed to him that the tarry and oily particles were in a very simple state, and were easily broken up, and sent back into the retort. The tar and gas as it went forward increased in velocity, until brought down to a certain temperature, when the tar was deposited. The question was as to which was the best place in which to fix this condenser. Mr. Reed was of opinion that it should be placed after the ordinary condenser. His (Mr. Bruce Peebles) reason for objecting to the title of the apparatus was that it did not condense at all, which he understood to be only accomplished by pressure or by cooling. Pélouze and Audouin's apparatus did not do either. The apparatus just explained by Mr. Hodgson Jones effected the same object as that effected by Pélouze and Audouin, but in a different way—it stopped the particles of tar from going forward; and his opinion was that here would be found a very valuable application of the principle to which he had referred.

Mr. MEAD (Reigate) said his own opinion was that in this case, as with naphthaline, gas managers, instead of trying to cure the evil, should try to prevent the cause. If they wished to avoid stopped pipes, let them keep them farther away from the stack, or build their front walls thicker.

Mr. THOMAS (Alton) said he had found, in his experience, that the cause of the stoppage was that the mouthpieces and ascension-pipes got too hot. Some time ago he was much troubled with stopped pipes, and he then tried many remedies. Among others he tried wetted nail bags tied round the pipe. These answered so long as the bags were kept wet; but in drawing and charging, the bags were often burned. He then tried an ordinary three-legged cast-iron pot, holding about a gallon of water, which he put into the mouthpiece after charging, immediately under the pipe. This, so long as the water lasted (about four hours) kept the pipes cool and clear; but it was found necessary, after four hours, to remove the lids and refil the pot with water. He also tried sheet iron round the pipes, much like stove piping, but of double the diameter of the ascension-pipe. This answered moderately well, so long as the piping was kept equidistant from the ascension, as it caused a swift current of air to rush up between the two, and cooled the pipe. In another bed of retorts, in which he was troubled with stopped pipes, he tried the effect of stopping up the front flue over the fire inside the front wall, and this effectually cured the evil. All his experiments clearly proved to him that the mischief was caused by the mouthpieces and ascension-pipes being too hot. The works had since been rebuilt, larger mouthpieces and ascension-pipes had been put in, and he had no longer any trouble in that direction.

Mr. HODGSON JONES, replying to some of the remarks of previous speakers, said, with regard to the difficulty of getting the gratings in and out, there was none practically. Of course, deposition took place on the mouthpiece of every retort, but it was usual for the stokers to clean out the mouthpiece after each charge; and, when this was done, there was no difficulty in removing and replacing the gratings. The only difficulty experienced at the outset was that which arose from the expansion of the gratings; they were constructed too large at first, and no allowance was made for expansion. As to the cost, the experience they had had proved that, at the present price of iron, they could be supplied at from 15s. to 20s. per mouthpiece per annum, including wear and tear.

Mr. ANDERSON: And including the cock?

Mr. HODGSON JONES replied in the negative, but said there was no wear and tear on that. Pélouze and Audouin's process, as compared with this, was a little different, inasmuch as the apparatus there consisted of plates with round holes in them. He believed that shields with round holes had been tried by many engineers, and the inconvenience attending them was that they threw back pressure upon the retorts. In the experiments with Vincent's apparatus at Hastings there was no cannel used at all, and yet the illuminating power was about the same as when cannel was used, so that there was a clear gain in this direction. He had always found a gain in that direction or in regard to the quantity of gas produced. Abroad, in works where poor gas was manufactured, they obtained 10,500 cubic feet per ton, using not more than 10 per cent. of cannel, because there, bulk was the object to be secured. By the use of these gratings he believed gas of equal illuminating power, and in the same quantity per ton of coal would be obtained as in the ordinary method was obtained by the use of a certain per centage of cannel.

The PRESIDENT said it seemed to him that this invention was a further development of the system recommended by Mr. Green, of Dartford, in a paper which he read at the last meeting of the association.

Mr. HODGSON JONES said Vincent's invention was patented before that.

The PRESIDENT remarked that, whether it was so or not, the principle seemed to be the same, and the discussion on the reading of Mr. Green's paper took very much the same turn. Of course every one admitted without question the evil of stopped ascension-pipes, and there were various means by which practically they might be prevented. The means suggested by previous speakers were generally sufficient, and the use of the apparatus brought under the notice of the meeting by Mr. Hodgson Jones therefore became a question of relative cost. It appeared to him that if he had to have an apparatus of this kind fixed in every retort, to be put in and taken out, and brushed and cleaned every time of charging, he should begin to think the remedy was almost worse than the disease. He would rather have stopped pipes. Last winter, in one section of the retort-house at his works, he had a great deal of trouble with stopped pipes. To get rid of the difficulty he employed a couple of men, whose special duty it was to put a large augur up every pipe after each charge. By this means all stoppage was soon prevented. He thought it better to cure the evil in that rough-and-ready way than by the use of any special apparatus. Still he did not wish to say one word against this apparatus; it was an ingenious, clever, and more scientific remedy for stopped pipes than the one which he had himself adopted, and therefore he was much obliged to Mr. Hodgson Jones for bringing it under the notice of the association.

The PRESIDENT read the following paper contributed by Mr. I. A. Crookenden (London) on

THE DESIRABILITY OF COMPANIES EXTENDING THEIR CONTROL TO THE POINT OF CONSUMPTION.

The companies do neither themselves nor the consumers justice by stopping short of all interference at the meter, or, in some cases (as when services pass through private grounds or premises), at a point some distance *from* the meter. The greatest care and skill, as you know, are exercised in filling the mains with gas of high illuminating power and purity; but, unless a proper supply to the nipple, and *perfect combustion there*, are secured, the maximum illuminosity of the gas is not obtained.

The companies, therefore, do themselves an injustice, and the consumers are unnecessarily inconvenienced and irritated.

The present plan is illogical, unreasonable, and vexatious. *Why* do we stop at the meter, and tell a complaining consumer, "We cannot investigate beyond this point; there is abundant pressure here; the fault must be in your fittings," and there leave him to remedy the defect as best he may? Is there anybody likely to know more about gas-fittings and burners, and the best means of securing effective supply to the burner, and the most complete combustion there, than we are? I think not, and submit that it is an error to leave the consumer to the expensive, annoying, and unsatisfactory remedy for defective lighting which now obtains.

But, in addition to the obligation which, I think, rests upon the companies to secure maximum light, is another consideration—*i.e.*, *profit*—which turns, not upon gas put into the mains, but upon gas *consumed*. We frustrate, as it seems to me, the perfection of our business by leaving the most delicate part of its supervision to other and often unskilled hands, and thus *imperfectly* perform it. This is all, surely, very illogical and objectless.

I submit, therefore, to this meeting whether it would not be desirable that the companies establish a branch of "skilled gas-fitters," whose duty should be to investigate complaints, and effectually remedy defects in pipes or burners.

In the large majority of instances, I believe the expense of this supervision would be so trifling as to be not worth charging for; but, in this respect, each case might be dealt with on its merits.

I am very desirous, however, that it should not be supposed that I advocate the supplying and repairing of gas-fittings, as is the case of some provincial companies; nor do I look for any profit whatever upon the direct operation of this branch. My views are, if I may so express it, *broader*—the object, to perfect our business, relieve our consumers from a state of helplessness to which we now leave them, and thus secure mutual comfort and confidence.

Mr. WATSON (Sydenham) said that, as an engineer of gas-works, he thought his responsibilities were quite heavy enough already, without undertaking the charge of internal fittings. Still, he quite agreed with the writer that it was not enough, upon complaints being made, for a manager to go and tell a consumer, "Your fittings are stopped up."

Mr. WOODALL (Bursalem) said six months ago he sent out circulars to every consumer, informing them that, in future, the inspectors would make inquiry as to whether their burners and fittings were in proper order, and, if there was any complaint, he was to look into the matter, and put it right,; and that, so far as burners were concerned, he would supply them at net cost.

Mr. CRAVEN (Dewsbury) referred to the recent explosion of gas at Halifax, and remarked that, though he should be willing to give every accommodation to the consumers in his district, he should most distinctly repudiate any responsibility as to their fittings.

Mr. DOUGLAS (Waltham) said he thought consumers should not be left without remedy in the case of a failure in the arrangements for their gas supply, but he believed that most Acts of Parliament prohibited gas companies from becoming gas-fitters.

Mr. WARNER (South Shields) said Mr. Crookenden had taken a very broad view of the question, and, in general, he quite agreed in the remarks made in the paper. The public had a right to demand a good and satisfactory supply of gas, and the plan adopted in his town was this—they interfered in no way with the business of the gas-fitters, but, when complaints were made, and the cause was ascertained, they told the consumers, "The fault is in your fittings. Go to your gas-fitter, and, if he cannot give you satisfaction, we undertake to do it, but it must be at your cost." In almost every instance they had succeeded in satisfying the consumer. Another matter might have been touched upon—the supply of gas from the mains to the meter, as well as the meter. In the north it was sometimes the practice to allow the plumbers to continue the fittings up to the main, which was very objectionable.

Mr. HISLOP (Paisley) said he had for some years indicated the propriety of the control of the gas up to the point of consumption, for, as a rule, consumers were very ignorant in the matter, and, of course, no class of men were so well posted up as gas managers. It would cause very little trouble to gas companies to give all necessary information to their consumers, and to name the kind of burner best suited for the gas they supplied.

Mr. PATERSON (Warrington) was afraid the remote consequence of the policy advocated by the writer would not be advantageous to gas companies. While conceding the point that companies should promote the interests of consumers as much as possible, and supply their little wants whenever practicable, he held it as a general principle that to lay themselves open to remedy the defects of imperfect fittings would be a very dangerous course to pursue. The company with which he had the honour to be connected had the whole of the fittings of the town in their own hands, and they carried on the business, not with a view to its becoming an element of profit, but for the convenience and satisfaction of the consumers. In all cases, however, a charge was made. There were other fitters in the town, and when their work was done imperfectly, and the consumers went to the company, they made it a point to decline any interference with bad fittings, and left it to the consumers to have the errors corrected by those whom they had first employed. But in every case where the work was originally done by the company they undertook that it should be done in a satisfactory way. In carrying out their arrangements, they had little or no trouble; but he confessed that he could not foresee what might be the remote consequence of carrying out Mr. Crookenden's suggestions.

Mr. WOODALL (London) said the advantages of adopting the system were so obvious that the matter appeared hardly open to discussion. Unquestionably there was an amount of absurd folly in the way in which gas was distributed over many houses which might fairly be met and remedied by some organization of the gas company, especially remembering the large costs they were put to in order to counteract these evil influences on the part of gas-fitters. They might just as well incur the same cost with credit as have to pay it after the event,

when they got nothing but obloquy. He was rather surprised that Mr. Crookenden disclaimed any wish to see gas companies becoming gas-fitters. For his own part he could see not the smallest objection to it, with the exception that, as a rule, the officers of a gas company had quite enough to do without engaging in a new trade.

The PRESIDENT said there was one point raised by Mr. Craven about responsibility which ought to be borne in mind. His own opinion was that as gas suppliers they ought to do all they could to assist consumers to burn gas to the greatest advantage; but they must be careful to guard themselves against responsibility for fittings which might lead to explosion and disaster. With reference to the observations made by Mr. Warner, there could be no question that gas companies should see that the pipes up to the meter were laid properly and safely, and not leave the matter in the hands of plumbers without inspection.

Mr. G. D. MALAM (Halifax) read the following paper on

UNIQUE EFFECTS FROM SIMPLE MEANS,
OR A DESCRIPTION OF THE LATEST RESULTS OBTAINED BY MR. ABRAHAM MALAM FROM HIS NEW PROCESS FOR MANUFACTURING CANNEL GAS, WITH MODELS, ETC.

In introducing the following observations upon the subject at the head of this paper for your consideration and comment, I not only intend, in the first place, to renew and possibly to extend amongst some of us our acquaintance with an invention that has been worked out practically by Mr. A. Malam; but, in the second place, I desire to cause a critical discussion upon its merits to be excited by you, gentlemen, who are so well able to form a practical opinion upon this subject, and who, no doubt, will take as many-sided a view of it as the results claimed may seem to deserve.

Before plunging into any explanatory statements, allow me to say that the impression made upon me by witnessing experiments that were carried out in my presence during my two days sojourn in Dumfries was of such a character that I am so far prejudiced in favour of Mr. A. Malam's process as to entertain the resolution to try it practically at my own expense upon a works where nearly 8 million cubic feet are annually manufactured.

In order to call to mind what are the novel arrangements which constitute the sum and substance of Mr. A. Malam's invention, I will here say that they consist, in the first place, in keeping the mouthpieces cool by causing a stream of water to flow into a cistern fixed around the pipes on the mouthpieces.

In the second place, in distributing, by means of a disc fixed inside the ascension-pipes, another stream or spray of water down the inner peripheries of the ascension-pipes, which not only keeps the pipes cool, but also frees them from the carbonaceous or other deposits that we know are usually left there by the ascending gas, and which, after having performed its cleansing and condensing operation, is conveyed away through pipes fixed on the under-side of the mouthpiece.

And in the third place, in maintaining a heap of incandescent coke about four feet long at the gas-educted end of the retort, through which the vapoury hydrocarbons are compelled to pass, and are thereby converted into gas.

You will observe from the drawing that the retorts are intended to be charged only at one end, and that the gas is conveyed away at the opposite, after it has passed through the hot coke.

This incandescent coke is periodically stirred up to allow the free passage of the evolving hydrocarbons through it, which would, if not occasionally loosened, be cemented together in one hard mass, and prevent the free egress of the gas from the retorts to the ascension-pipes.

The tar arising from the novel treatment the raw gas has to undergo is nearly of the consistency of soft pitch, having nearly all the light naphthas removed from it into the illuminating gas. A bottle full of the residual tar is on the table, and from its state you may probably judge of the effect the four feet of hot coke previously spoken of has had upon the liquid hydrocarbons that would have been condensed therein when the ordinary process of cannel gas manufacture was carried out, but which evidently are abstracted under the reformed system.

During my stay in Dumfries, I made three several trials with the whole of the retorts charged at one time, and that test with the best Scotch cannel gave 14,400 cubic feet per ton; that with Newcastle coal, 13,400 feet; and that with a shaly species of cannel, 11,600 cubic feet. I did not test the accuracy of the station-meter, but have no reason to doubt the truth of the affirmation I received, that it was in the same condition as when only 9000 cubic feet per ton were obtained under the old process.

Probably better results than these just mentioned would be obtained if an exhauster were judiciously used to relieve the retorts of 25-10ths back pressure.

But the question that naturally occurs to such practical minds as are here will be upon hearing these statements—Is this large quantity of gas obtained per ton a permanent gas?

I have to say, in answer to that query, that the leakage is only 2 per cent. more under the new system of carbonizing than under the old, so that the permanency of the gas may be taken as an established fact.

Let me add further that the permanency of the gas has shown itself by the following satisfactory facts—that it has earned an extra 10 per cent. dividend for the shareholders of the Dumfries Gas Company during the time that famine prices have been paid for cannel, whilst, subsequently, it has also enabled the directors to reduce the price of gas to 5s. per 1000 for large consumers, or 6s. per 1000 to small.

I must in justice to Mr. Malam also record the fact that he has obtained these unusual successes, during the past 12 months, notwithstanding the serious difficulty of having to distribute gas through duplicate sets of mains—one set belonging to the Dumfries Gas Company, and the other to the late Maxwelltown Gas Company, which the Dumfries Gas Company bought up some time ago, and whose mains are of so defective a character that (as I am informed) no dividend was earned by them for years past.

As to the illuminating power of the gas, I will here quote a passage from a lecture Professor Macadam delivered in Dumfries last December. "In that town," he is reported to have said, "we have very good gas. Last week I dropped into the works, unknown to the manager, and tested its quality, and found its luminosity was equal to 27 sperm candles."

This report upon the quality of the gas made under the new process shows that the luminosity of the gas thus obtained is not, as some might imagine, of an inferior character; and that, although a larger quantity is extracted per ton of coal, that larger quantity is thoroughly well illuminated by the naphthas and light oils that are thrown off during distillation.

When Dr. Eveleigh's process for manufacturing gas was under discussion here in 1872, it was stated by a London engineer of very considerable experience in the carbonization of English and Scotch cannels, that "he did not make anything like the quantity of gas he desired to make from Scotch cannel, and that he found himself from 10 to 25 per cent. behind in the results he obtained as compared with those obtained by chemists and experimentalists."

If other engineers who have to deal with rich cannels would be as candid in the expression of their opinions, probably they would have to make a similar confession.

To any engineer who may be so circumstanced as to be from 10 to 25 per cent. in his every-day results behind those of experimentalists, this practical and paying process of Mr. A. Malam stretches forth a helping hand to assist him in his difficulties; and to all engineers who do not think they have arrived at a sufficiently perfect state in the knowledge of their profession, this novel plan is, I imagine, deserving of their serious personal attention.

In conclusion, I have to observe that I am in no way pecuniarily interested in this invention, and I trust my observations will be received, as I have made them, in a disinterested spirit.

Mr. PATERSON (Warrington) asked whether he was to understand that, taking the normal quantity of gas produced from Newcastle coal at 9500 cubic feet, Mr. Malam realized by this process 14,400 cubic feet.

Mr. MALAM said 13,400 was registered on the meter. He charged four large D retorts 22 inches on the bottom with a certain measured quantity of coal, and in four hours obtained gas at that rate per ton of Newcastle coal.

Mr. PATERSON asked what was the illuminating power.

Mr. MALAM said a little over 14 candles. In answer to several further inquiries he said the first question was in connexion with the coal. It was stated to be a banded coal. He believed there was a small quantity of cannel with it; but he learned at Carlisle that the quantity of gas usually obtained was 9000 feet, and when he tried the same coal at Dumfries, it gave by the station-meter 14,400. He did not know whether the station-meter was correct, but he was told that before the new process came in the station-meter only showed 9000. Upon the average of the whole year it was 13,000. He believed the reason why he obtained 14,400 was that he had some English coke.

Mr. ANDERSON (London) said, although he had listened to the paper, he did not know how these grand results were obtained. He wished Mr. Malam would explain the *modus operandi*.

Mr. MALAM said the gas had to go through 4 feet of hot coke, and the vapours thrown off were turned into permanent gas.

Mr. WATSON (Sydenham) said Mr. Lowe did the same thing years ago.

Mr. MALAM said he did, and had his pipes stopped up; but the plan here was different, inasmuch as there was a spray coming down the ascension-pipe.

The PRESIDENT remarked that it was stated, in reference to the plan, that it applied to cannel coal especially; and, so far as he could gather, the light naphthas produced by it were, in this case, converted into gas, which would account, to a considerable extent, for the increased quantity of gas made. A full description of the apparatus and arrangement had appeared in the JOURNAL OF GAS LIGHTING, and Mr. Malam was, therefore, somewhat restricted in preparing his paper, as he could not give a second-hand description here. He was obliged to confine his remarks to giving further experience in the matter.

MR. SILBER'S INVENTIONS.

On Saturday evening, an interesting exhibition was made at the London Tavern of the Silber gas-burner and several other inventions for illuminating purposes.

As regards the gas-burners, we can only say that, as the experiments made lacked any scientific precision, we must, for the present, defer a positive opinion as to their merits; but this may be said, that, exhibited in a row with the Argands most commonly in use, and apparently under identical conditions, the light given by the Silber burners far exceeded that afforded by any other. Mr. Silber gave a short address, in which he reviewed the progress made in the construction of circular burners since the time of Argand, and described the principles to be kept in view in order to obtain the maximum amount of light from gas. These may be said briefly to consist in allowing the gas to issue at a minimum of pressure, and in furnishing a proper supply of air *to all parts of the flame*. The Argand burners will furnish the subject of a separate notice; but we may mention a new bat's-wing burner which is thus reported on by Dr. Valentin:—

"The new burner may be briefly described as a double burner, consisting of two bat's-wings, the one capable of delivering, say, about 3 cubic feet of gas into a pear-shaped metal cup crowned with a second bat's-wing burner, capable of delivering about 5 cubic feet of gas. By these simplest of means the amount of gas issuing from the top burner can at no time be greater than the smaller burner allows of, and it must, therefore, issue from the upper or larger burner at a minimum of pressure. Gas burned under these conditions from bat's-wing burners is known to give the maximum of illuminating power. The photometrical results obtained by me fully bear out the correctness of these conditions. The illuminating power produced by these burners, consuming from 2 to 8 cubic feet of gas, ranges from 4 to 30 candles; and they may, therefore, be considered a considerable improvement upon burners of a similar kind hitherto constructed."

The other novelties exhibited consisted of ship, railway, and other lamps of wonderful power and brilliancy, but of which a description must be deferred. It is sufficient to say that the display was witnessed by a number of scientific men, who expressed more than satisfaction with what they saw.

IRON AND COAL TRADES OF SHEFFIELD, NORTH DERBYSHIRE, AND SOUTH YORKSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The iron trade hereabouts is in an inanimate and very unhealthy condition. Every branch is afflicted to a greater or less extent, and in no single instance am I able to hear of any probability of an early revival of activity. The high price of fuel has in all cases been fatal to the due and proper sustention or extension of business connexions, seeing that, with the exception of those firms which have their own collieries, quotations have been rendered so high that orders have been lost either in favour of foreign competitors or houses in other districts, where fuel is obtainable on easier terms. The slow demand thus naturally brought about had, at last, its effect upon the coalowners, who determined to reduce wages in order, as they state, to enable them to put down the price of coal.

In the first instance they met at Barnsley, and determined to give notice of a 20 per cent. reduction; but, after conferring with some of the leaders of the men, agreed to make it 12½ per cent. only, to be taken from the gross earnings current on May 20. The men's delegates met several times to consider the question, and resolved to agree to a 10 per cent. reduction from the total 57½ per cent. *advances* given since October, 1871. This is exactly half what the masters require, so that a direct issue was at once opened up. As a final effort to obtain their terms, and prevent a strike, the council of the Miners Association met at Barnsley, on Monday, and agreed to accept a 10 per cent. reduction from the gross earnings, asking also that the drop should commence from July 8 instead of May 20. This thus virtually leaves the difference a matter of 2½ per cent. and the time. The masters are likely to remain firm, in which case they will, doubtless, win the fight. On Monday the men held a great mass meeting at Barnsley; but, instead of calmly considering the matter, they hooted the secretaries, who gave them the good advice to accept the drop. Mr. Normansell, secretary, said their funds were inadequate to support so large a body of men long; that in every other district the men had been beaten, and that they had better give in. At about a dozen collieries a compromise has been effected, and at four more the men have resumed work at the drop.

THE NORTHERN COAL TRADE.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of Northumberland and the northern division of the county of Durham was active last week. There was a good demand for steam coal, and a considerable quantity of gas coals were shipped to Cronstadt and the Baltic by steamers. Household coals were in moderate demand. The production of so much first-class steam coal has caused quite a glut of small coals at the collieries, which have been offered as low as 14s. per chaldron; in some instances coals for mixing are likewise quoted at a reduced figure. There has been a falling off in wood freights from the Baltic. In consequence of this

outward business has got higher, and more money has to be paid in coal freights, not only to the Baltic, but to London, the coast, and most parts of Europe. A fair number of coasting vessels came to hand on the Tyne and Wear last week, but they were soon picked up at rather more money than in the previous week.

There were large arrivals of timber in the north-eastern ports last week. As already reported, building material has got more plentiful in the North, and it does not look as if the high prices for timber could be maintained. The chemical business of the Tyne was not quite so strong in the early part of last week, and the advance of the previous week was barely maintained, but the trade took a rally on Friday, and was better again. The iron trade keeps flat, and the collieries depending on that trade have been, and are, accumulating stock. The somewhat low price of coke has induced more inquiries from abroad, and a better shipping business has been done in coke to Spain and distant ports.

INSTITUTION OF CIVIL ENGINEERS.—The council of this society have just awarded the premiums and prizes, arising out of various trust funds, for papers read and discussed during the recent session. Amongst the awards are the following:—A Watt medal and a Telford premium to Alexander Carnegie Kirk, Assoc. Inst. C.E., for his paper on "The Mechanical Production of Cold;" and a Telford premium to Joseph M'Carthy Meadows, for his paper on "Peat Fuel Machinery." Amongst the prizes awarded to students of the institution are the following:—A Miller prize to James Charles Inglis, Stud. Inst. C.E., for his paper on "Theory and Practice in the Construction of Tanks;" and a Miller prize to George Edward Page, Stud. Inst. C.E., for his paper on "Coal Gas and its Manufacture."

ACCIDENT AT THE SHEFFIELD GAS-WORKS.—On Wednesday morning last an accident occurred at the Neepsend station of this company, by which five men were seriously injured. The company are erecting a new retort-house, and a number of men, some in the employ of the company as labourers, and others in the employ of the contractor for the building, were engaged upon the works in connexion with the roof. Shortly before twelve o'clock, when about 17 iron principals were up, it was discovered that the centre ones were not plumb, and the men immediately set to work to remedy this defect. To do this a crab was erected, as it was thought that by this means the columns would be pulled into their place. They had been started about a couple of inches, when one of the guide-ropes broke, and the result was that a large portion of the roof came down with a crash, burying some of the unfortunate workmen beneath. The injured men were as quickly as possible conveyed to the infirmary, and the latest accounts state that they are progressing as well as the serious injuries sustained by them will admit.

MEDICAL OFFICER OF HEALTH FOR THE CITY OF LONDON.—At the City Sewers Court, on Tuesday last, a letter was read from the Local Government Board, requesting "that there may be forwarded to the board evidence that Dr. Saunders possesses competent chemical and microscopical knowledge, as required by the 5th section of the statute 35 & 36 Vict., cap. 74." The communication was referred to the Sanitary Committee, with power to take such steps as might be necessary. Mr. E. Davis had a notice of motion on the *agenda* to the effect—"That a special committee be appointed, consisting of nine members, to inquire and report as to the legality of the late election of medical officer and food analyst, power being given to obtain such legal assistance as they may deem necessary." He desired, before proposing this motion, to ascertain whether the solicitor of the court still retained his opinion that, Dr. Saunders being at the time of his election a member of the Common Council, such election was null and void. The chairman, however, opposed the proposal, and, on being put to the vote, it was negatived; whereupon Mr. DAVIS said that, seeing the feeling of the court on the question, and that there was not the slightest chance of his motion, if proposed, being carried, he would, with the permission of the court, withdraw it.

SCOTCH GAS UNDERTAKINGS.—At Arbroath the assessments of the Gas Corporation for the year to the 31st of May show a deficiency of £1347 5s. 8d. It is accounted for by the high price of coals. The price of gas is fixed by the local Act of Parliament at 5s. 10d. per 1000 feet. Last year the cost of manufacture was 6s. 10d. Under that Act the deficiency must be assessed on the ratepayers. The Anstruther Gas Company have just declared a dividend of 6 per cent. for the past year, instead of 8 as usual. At the annual meeting of the Hawick Gas Company a dividend of 10 per cent. was declared, and it was decided that the price of gas continue at 7s. 1d. The Jedburgh Gas Company have reduced the price from 8s. 9d. to 8s. 4d., and have just declared a 10 per cent. dividend. The Alyth Gas Company have declared a dividend of 4 per cent., but as there was no cash to meet this, it was agreed to borrow the sum required. The price of gas is 9s. 2d. The Irvine Gaslight Company have declared a dividend of 20s. per original, and 5s. per quarter share. The directors have been authorized to lower the price of gas as they see fit. The Crieff Gas Company have resolved to divide 7½ per cent. for the past year, but it was agreed that no alteration take place in the price of gas, which is 9s. 2d. per 1000 cubic feet. The Kilsyth Company have declared a dividend of 5 per cent. The Town Council of Dumbarton have appointed Mr. James M'Gilchrist, manager of their gas works, in room of Mr. William Key, who has resigned for another situation in England.

DUNDEE WATER SUPPLY.—The accounts of the Water Commission for the past year show that there has been a total revenue, including a surplus of £2163 4s. 6½d. from the previous year, of £28,593 1s. 7½d. The total expenditure amounted to £23,081 13s. 3d., leaving a surplus at the end of the year of £5511 8s. 4½d. There was thus a total increase on the year, notwithstanding the reduction of 1d. on the domestic rate, of £3348 3s. 10d. The expenditure on capital account last year was £40,542 6s. 10d., and the money borrowed £53,431. The total expenditure by the commissioners up to the close of the year, exclusive of the capitalized value of the annuities, was £147,736 12s. 7d., and the money borrowed £174,291 5s., of which there remained unexpended £26,554 12s. 5d. The last year's expenditure consists of £32,631 0s. 7d., in respect of the Lintrathen works; £7685 13s. 8d. for redistribution schemes and extension of piping; and £225 12s. 7d. for miscellaneous. The engineer's report on the progress of the Lintrathen works shows that, of the main embankment at Bridgend of Lintrathen there is a quantity of ordinary embanking done of 16,500 cubic yards, being 4500 yards during the past month. In all there is a quantity of 6776 cubic yards of puddle put into trench and puddle wall in the heart of the embankment, and on an average the embankment is brought up to within 12 feet of the top. Of the waste weir channel there is about one-half of the earth excavation, or 13,000 cubic yards, taken out; and the excavation in rock has been commenced for the masonry crest of the weir. The intake channel for Lintrathen Mill is finished, and the weir channel is finished up to the outlet culverts. Of the town outlet, measuring in all 1207 lineal feet, there is a length of 1153 feet excavated or tunnelled, leaving only 54 feet to tunnel; and there is a length of the arching done of 688 feet, leaving 519 lineal feet of masonry or brickwork to do. The sluice-shaft at the loch end is finished, with the exception of the pavement cover, and the pitching of the channel from the loch is finished in the bottom and half done up the sides. The masonry of the measuring cistern at the lower end of the outlet tunnel is finished, except the pavement floor; the outlet-pipes are built in, and two-thirds of the walls of the house above are built. Some delay has taken place in this work, and complaints and threats of damages have been made by Mr. Easton Gibb, the contractor, in consequence of Messrs. Laidlaw, contractors for the pipes and sluices, being beyond their time in supplying the pipes out through the embankment. On the whole, very satisfactory progress had been made during last month, and is now being made, and there is every appearance of the works being completed within the specified time.

Share List,
OF
Metropolitan Gas and Water Companies.

(*Corrected by Mr.* F. N. GOLDING, *Sun Court, Cornhill, from the latest Stock Exchange Quotations.*)

Number of Shares Issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	14 — 16
5000	20	Bahia (Limited)	20 0 0	3 0 0	10 — 11
1000	20	Do., preference	20 0 0	10 0 0	25 — 27
750	20	Do., do., redeemable	20 0 0	10 0 0	20 — 22
40000	5	Bombay (Limited)	5 0 0	6 15 0	6 — 6½
10000	5	Do., fourth issue	4 0 0	6 15 0	¾—1¼ pm.
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	33 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	14 — 16
180000	10	*Chartered* A ordinary	10 0 0	10 0 0	16½ — 17
25000	10	Do. A, 5 per cent. preference	10 0 0	5 0 0	14½ — 15
20000	10	Do. A, 5 per cent. do., 2nd issue	10 0 0	5 0 0	14½ — 15
30000	10	Do. A, 5 per cent. do., 3rd issue	10 0 0	5 0 0	4¼—4½ pm.
10000	10	Do. B, 4 per cent. maximum	10 0 0	4 4 0	7 — 7½
20000	10	Do. C, 10 per cent. preference	10 0 0	10 0 0	20½ — 21½
12000	25	Do. D, 10 per cent. preference	25 0 0	10 0 0	51 — 53
4488751.	Sk.	*Commercial*	100 0 0	10 0 0	170 —173
20000	20	Continental Union	20 0 0	8 0 0	19 — 20
20000	20	Do., new	12 10 0	8 0 0	½ dis.—par.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 — 25
5000	10	*Crystal Palace District*	10 0 0	10 0 0	16 — 17
5000	10	Do., preference	10 0 0	6 0 0	11¼— 12½
10000	10	Do., ordinary	10 0 0	7 0 0	12½— 13½
2500	10	Do., converted	2 0 0	10 0 0	1½— 2 pm.
2500	10	Do., converted	2 0 0	7 0 0	1 —1½ pm.
23406	10	European (Limited)	10 0 0	8 0 0	14 — 15
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	7 10 0	8 0 0	2½—3 pm.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	14 — 15
1560000	100	*Imperial*	100 0 0	10 0 0	171 —174
78000	12½	Do., new shares	12 10 0	7 0 0	16¼— 16¾
1300	100	Do., bonds	£100	10 0 0	197 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	45 15 0	9 2 6	56 — 58
3000	40	*Independent*	40 0 0	10 0 0	65 — 67
3000	10	Do.	10 0 0	5 0 0	8½— 9½
3000	20	Do.	20 0 0	7 10 0	25 — 26
4500	10	Do., D	3 0 0	10 0 0	3 — 4 pm.
378350l.	Sk.	*London*	100 0 0	10 0 0	168 —171
150000l.	Sk.	Do., 1st preference	100 0 0	8 0 0	118 —121
14450	Sk.	Do., 2nd preference	100 0 0	6 0 0	
4350	Sk.	Do., 3rd preference	100 0 0	6 0 0	
7622	25	Do., A shares	12 10 0	6 0 0	
268051.	All	Do., Debenture stock	100 0 0	5l. & 6l.	
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	2 — 2½
6000	5	Do., preference	5 0 0	7 0 0	5 — 5½
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2½
25000	20	Monte Video (Limited)	20 0 0	..	22 — 23
8000	10	Nietheroy, Brazil (Limited)	10 0 0	..	
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	7 — 7½
30000	5	Do., new shares	2 10 0	9 0 0	¾— 1½ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	2 — 2½
17500	10	Pará (Limited)	10 0 0	7 0 0	6 — 8
27000	20	*Phœnix*	20 0 0	10 0 0	34 — 35
3600001.	100	Do., new	55 0 0	7 10 0	71 — 73
144000l.	Sk.	Do.	100 0 0	5 0 0	93 — 95
5000	20	*Ratcliff*	20 0 0	10 0 0	33 — 35
36000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	31½— 32½
7359	5	Singapore (Limited)	5 0 0	7 10 0	4½— 5
2000	5	Do., preference	5 0 0	7 10 0	5½— 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	85 — 87
4000	12½	Do.	12 10 0	10 0 0	21 — 21½
20000	12½	Do., new shares	5 0 0	10 0 0	6¼— 6½ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	16¼— 16½
10000	10	Do., new	7 0 0	10 0 0	5 — 6 pm.
9000	4	United General (Limerick)	4 0 0	2 10 0	2 — 2½
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7½ — 8
10000	5	Do., new shares	2 10 0	10 0 0	3— 4
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	124 —126
1800000	100	East London	100 0 0	6 0 0	124 —126
8000	50	Grand Junction	50 0 0	8 10 0	75 — 77
5840	25	Do., ¼ shares	25 0 0	8 10 0	36½— 37½
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 10 0	31 — 33
4396	100	Kent	100 0 0	6 0 0	125 —127
5339	100	Lambeth	100 0 0	6 5 0	125 —127
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	
4443	100	Do.	80 0 0	8 0 0	36 — 38
400000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	97— 99
3036	100	Southwark and Vauxhall	100 0 0	5 5 0	105— 107
1296	100	Do., preference stock	100 0 0	5 0 0	101— 103
	100	Do., D shares	100 0 0	5 5 0	95— 97
		Do.	..	4 10 0	
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
12173	61	West Middlesex	61 0 0	£6 per sh.	121—123

Register of New Patents.

3205.—FORBES, G. H., Broughton Rectory, Northampton, "*Improvements in compounds designed to be used as fuel, or for the manufacture of lime, cement, plaster, and artificial stone.*" Patent dated Oct. 3, 1873.
This invention relates to a further development of the invention described in the specifications of former letters patent granted to the present patentee, and is designed to improve the various compounds, and in some cases to simplify the process of manufacture described in those specifications.

3219.—HARROP, J., Manchester, "*Improvements in taps or valves.*" Provisional protection only obtained. Dated Oct. 4, 1873.
This invention consists in protecting the spindle and working surfaces or faces of disc-valves from corrosive action or wear, by applying thereto a corresponding disc on a tube that surrounds the spindle.

3224.—WEST, J., Maidstone, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Oct. 4, 1873.
This invention consists in the application of steam, air, or gas, to effect the sealing and unsealing of the dip-pipe in the hydraulic main, the hydraulic main being constructed with a longitudinal partition from the top to nearly the bottom, thus dividing the main into two general chambers, one for gas and the other for steam. These are subdivided by transverse partitions. Liquid is supplied to the hydraulic main to a height just sufficient fo seal the dip-pipe. Steam is then admitted to the steam-chamber, and by its pressure causes the liquid in the hydraulic to rise and form an efficient seal. When it is desired that the seal of the dip should be removed the steam is shut off, and as that in the steam-chamber will condense, a tendency to produce a vacuum will be formed, when the liquid in the hydraulic will flow into the steam-chamber and unseal the dip, leaving a free passage for the gas.

3225.—WEST, J. Maidstone, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Oct. 4, 1873.
This invention relates to improvements or additions to apparatus for the invention of which letters patent No. 1255, dated April 4, 1873, were granted to the present patentee, and consists in using, where more advantageous or convenient, short mouthpieces and ordinary lids, and one charger to a number of retorts, instead of long mouthpieces with a separate charger to each, as described in the specification of the patent referred to. Also in providing a travelling carriage with stages, and a hopper and shoot for filling the chargers with coal, the carriage being also used to support the charger and convey it from one retort to another. Also in an attachment to the disc for spreading the coals. And in an arrangement for working long or through retorts by the application of charges from both ends.

3227.—RITCHIE, C., Brixton, "*Improvements in apparatus for utilizing heat for heating, cooking, ventilating, and lighting.*" Patent dated Oct. 4, 1873.
This invention principally refers to arrangements for placing burners or heaters at a position near the lower portion of the operative parts of the apparatus, the flame or flames being deflected or drawn horizontally, and then carried up air-shafts forming part of the apparatus.

3240.—CLARK, A. M., Chancery Lane, London, "*An improved regulator for ga and other fluids.*" A communication. Provisional protection only obtained Dated Oct 6, 1873.
The regulator consists of a chamber screwing on the burner and enclosing a ball which is free to rise and fall therein. The ball rests on a number of projecting points above the inlet orifice when the pressure falls, and as it increases the ball is raised and closes more or less the outlet orifice, which is made conical, and provided with grooves through which the fluid is allowed to escape in regulated quantity.

3243.—BLAKE, E. O., Leadenhall Street, London, "*Improvements in apparatus for carburetting and supplying carburetted air for lighting and heating purposes.*" A communication. Provisional protection only obtained. Dated Oct. 6, 1873.
This invention relates to a peculiar construction and arrangement of apparatus for carburetting atmospheric air by the use (by preference) of the liquid hydrocarbon known in commerce as gasoline (although other volatile liquid hydrocarbons may be employed if desired), and for supplying such carburetted air for lighting and heating purposes. One of the essential features of this apparatus (which may be either fixed or portable) is, that the carburetting chamber or cylinder is entirely surrounded by or submerged in water, or in a mixture os water and glycerine; hence perfect immunity from all risk in case of fire if obtained.

3264.—GARDNER, H., Holloway, "*Improvements in treating air for the production of hydrocarbon gas, and in apparatus or appliances therefor.*" A communication. Patent dated Oct. 8, 1873.
These improvements consist in forcing air, by means of a pump or blower, into receptacles under pressure, so that it can be withdrawn and be passed over the surface of petroleum, or other gaseous oil or spirit, for it to become impregnated with the vapour to produce light and heat.

3269.—BLACKER, D., Thornhill Lees, Yorkshire, "*Improved means or method of and apparatus for condensing, and for attracting and absorbing the noxious gases arising from the combustion of coal gas used in connexion with blast furnaces.*" Provisional protection only obtained. Dated Oct. 9, 1873.
A perforated pipe conveys steam or water into the flue or flues, thus condensing the gases; or a perforated vessel containing hydrochloric acid or sulphuric acid is placed between the furnace and the chimney. This vessel is also used unperforated, and merely as a holder of the diluted acid or acids which attracts and absorbs the gases.

APPLICATIONS FOR LETTERS PATENT.

2220.—TACKELS, C. J., Brussels, "Improvements in gas-burners." June 28, 1874.
2243.—BISCHOF, G., Andersonian University, Glasgow, "Improvements in water-filters." June 29, 1874.
2245.—MORGAN, O. V., Kensington, Middlesex, and MOELCHAERER, G. R., Battersea, Surrey, "Improvements in stoneware filters and coolers for filtering and cooling water." June 29, 1874.
2246.—MURDOCH, H. H., Staple Inn, London, "Improvements in closing the ends of metal pipes, and in connecting and soldering metal pipes together, and in the combination of metals or alloys for the latter purpose." A communication. June 29, 1874.
2267.—MURPHY, J. L., Edgbaston, "Improvements in raising fluids." June 30, 1874.
2270.—CLARK, A. M., Chancery Lane, London, "Improvements in the manufacture of gas and fuel." A communication. June 30, 1874.
2274.—CONNELL, W., Glasgow, "Improvements in valves for water-supplying apparatus." July 1, 1874.
2295.—EDWARDS, D. O., Bayswater, "An improved apparatus for the promotion of ventilation and other sanitary purposes." July 2, 1874.
2299.—FOWLER, A. M., Salford, "Improvements in the construction of privies and water-closets." July 2, 1874.
2315.—BENTLEY, J., Birmingham, "An improved sanitary apparatus or pump for raising and delivering sewage or other diluted refuse matter, but which said apparatus is also applicable for elevating and delivering water or other fluids." July 3, 1874.
2318.—KUNSTADTER, J. J., Camomile Street, London, "Improvements of apparatus for causing the flow of liquids, and also in apparatus to obtain motive power from the flow of liquids." July 3, 1874.
2328.—COLLS, F. W., Erith, Kent, "Improvements in safety-valves." July 3, 1874.
2330.—COLLS, F. W., Erith, Kent, "Improvements in traps for preventing the escape of gases from sewers and drain-pipes." July 3, 1874.
2338.—WELLS, J., Wednesbury, "Certain improvements in main-cocks for gas and water purposes." July 4, 1874.

GRANTS OF PROVISIONAL PROTECTION.

2169.—LAKE, W. R., Southampton Buildings, London, "An improved process and apparatus for making illuminating gas." A communication. June 22, 1874.
2185.—GAMBONI, P., Harley Street, London, "Improvements in pumps or apparatus for raising or forcing air or water." June 23, 1874.
2197.—NEWTON, H. E., Chancery Lane, London, "Improvements in gas-burners." A communication. June 24, 1874.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATIONS.

2100.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in lighting and heating by means of liquid fuel." A communication. June 17, 1874.
2209.—HASELTINE, G., Southampton Buildings, London, "Improvements in gas-engines." A communication. June 25, 1874.
2246.—MURDOCH, H. H., Staple Inn, London, "Improvements in closing the ends of metal pipes, and in connecting and soldering metal pipes together, and in the combination of metals or alloys for the latter purpose." A communication. June 29, 1874.

NOTICES TO PROCEED.

622.—SIEBERT, O., New York, U.S.A., "Improvements in gaslight apparatus." Feb. 19, 1874.
641.—HOLLAND, H., Birmingham, "Improvements in the manufacture of gas for illuminating and heating purposes." Feb. 19, 1874.
643.—TRUEMAN, H. P., Pentonville, Middlesex, "Improvements in apparatus for measuring liquids." Feb. 20, 1874.
653.—SCOTT, H. Y. D., Ealing, Middlesex, "Improvements in the treatment of sewage and in the manufacture of manures therefrom." Feb. 20, 1874.
1002.—SMITH, A., Loughborough, Surrey, "Improvements in the means for purifying water." March 23, 1874.
1733.—PONTIFEX, E. A., Shoe Lane, London, "Improvements in apparatus to be used in drawing off water, and in measuring the quantities drawn off." May 15, 1874.
1978.—WEST, J., Maidstone, "Improvements in apparatus used in the manufacture of gas." June 8, 1874.
1983.—DANN, J. T., North Brixton, Surrey, "Improvements in the construction of apparatus for lighting, extinguishing, and regulating gas-flames." A communication. June 8, 1874.
2017.—HEALE, H. W., Southwark, Surrey, and GOWAN, E. D., Holloway, Middlesex, "Certain improvements in the manufacture and construction of taps or valves." June 10, 1874.
2034.—CLIFF, W. D., Wortley, near Leeds, "Improvements in machinery for making clay retorts." June 11, 1874.
2100.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in lighting and heating by means of liquid fuel." A communication. June 17, 1874.
2169.—LAKE, W. R., Southampton Buildings, London, "An improved process and apparatus for making illuminating gas." A communication. June 22, 1874.
2209.—HASELTINE, G., Southampton Buildings, London, "Improvements in gas-engines." A communication. June 25, 1874.

LUDLOW GAS-WORKS.

WANTED, a competent Working Foreman who understands the management of an exhauster, and can set retorts. Wages £1 10s. per week, with house at the works rent free, also coal and gas free of charge.

Candidates to address applications and forward their testimonials to the SECRETARY, Ludlow Union Gas Company, LUDLOW.

A Practical and experienced Engineer, Fitter, &c., is open to an engagement as MANAGER, or to undertake and assist in the erection of works (including the retorts, to consumers burners). No objection to travel. Salary £100, or as per agreement.
Address 38, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ENGINEER, thoroughly practical, as WORKING FOREMAN or otherwise, late of The Gaslight and Coke Company, Blackfriars, requires an engagement. Understands manufacture and distribution, gas-fitting, &c. First-class testimonials from superintendent. Works closing.
Address ENGINEER, 7, Doris Street East, Prince's Road, LONDON, S.E.

GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,
19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.
N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.
"The Author is well qualified to speak authoritatively upon the imports t subjects to which his pamphlet refers."—*Artizan.*

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

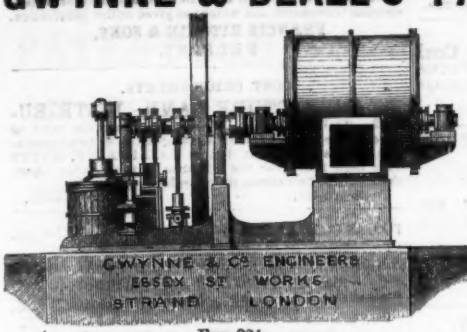


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

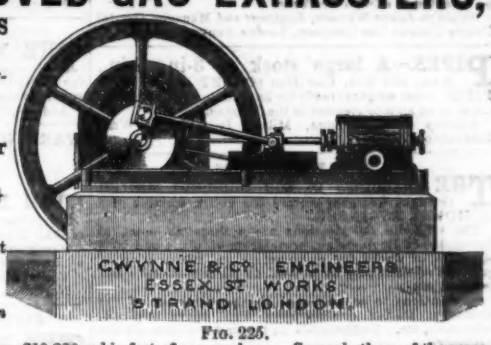


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

GEORGE ORME & CO.,

GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,

ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,

And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

D. BRUCE PEEBLES & CO.'S

PATENT

LAMP REGULATOR

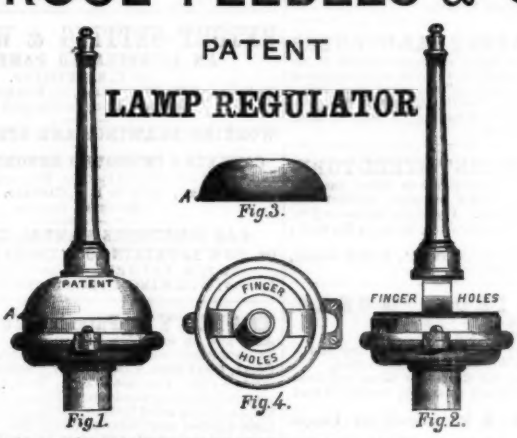


Fig.3. Fig.1. Fig.4. Fig.2.

D. BRUCE PEEBLES AND CO.,

ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,

PATENTEES OF

GAS REGULATORS FOR PUBLIC LAMPS, FACTORIES, PUBLIC HALLS, AND DWELLING-HOUSES.

Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—

"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."

Since the above date, another 1000 have been supplied to Glasgow, and they are being largely adopted at home and abroad.

D. B. P. and Co. are prepared to Estimate for the Supply and Maintenance of their Regulators, and will be glad to forward terms on application.

D. BRUCE PEEBLES AND CO.,

ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,

FOUNTAINBRIDGE WORKS, EDINBURGH.

WANTED, a situation as Working MANAGER or Foreman. Thoroughly understands the manufacturing of gas in all its branches. Aged 30.
Apply to F. SCOTT, Gas-Works, BUXTON.

WANTED, by a young Man, a situation as METER-FIXER, Fitter, Index-Taker, &c.
Address M. M., care of Mr. Kirby, 14, Little Albany Street, Regent's Park, LONDON.

WANTED, a deputy Working Foreman, for retort-house. Must be sober and active. Wages 38s. per week. A considerable portion of Sunday allowed. State age, experience, and present employment.
W. J. WARNER, Engineer.
Gas-Works, South Shields, July 11, 1874.

WANTED immediately, a Working MANAGER for a small Gas-Work. One who understands the manufacture and distribution of gas, retort-setting, &c. He will also have to collect accounts. House, gas, and fuel free.
Apply, stating salary required, to the SECRETARY, Gas-Works, Southend, ESSEX.

GAS-MAINS.

WANTED, 150 tons 8-in.; 200 6-in; 250 4-in.; 250 3-in.; 150 2-in.; f.o.b. Glasgow, West Hartlepool, Middlesborough, or Liverpool. Total, 1000 tons.
Send lowest cash price to WILLIAM BLEWS AND SONS, Gas Engineers, BIRMINGHAM.

WANTED, an engagement as Manager or MANAGER and SECRETARY of a medium sized Gas-Work. Thoroughly understands the manufacture and distribution of gas, having had many years experience, and can give most excellent testimonials as to character and ability.
Address MANAGER, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gentleman, aged 27, a situation as MANAGER, on the Continent or abroad. Advertiser has been four years in present situation, where the make is above 90,000,000 feet per annum. Understands the manufacture and distribution of gas in all its branches. Speaks French and Italian. Leaving present situation on account of salary being insufficient.
Address SCIENCE, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Gas-Work in the West of England, where the make does not exceed 10 millions per annum, an experienced WORKING MANAGER, who thoroughly understands the manufacture and distribution of gas, the setting of retorts, and is conversant with every detail in connexion with the efficient management of a Gas-Work, but will not be required to keep the accounts.
Apply, by letter, with copies of testimonials, and particulars as to capabilities and salary required, addressed to X. Y. Z., care of Messrs. G. Glover and Co., Banclagh Road, LONDON, S.W.

VINCENT'S

PATENT IMPROVEMENTS

IN

Apparatus for Manufacturing Gas.

Particulars to be obtained by application to—
MR. LAYARD JONES,
ENGINEER,
25, OLD BROAD STREET, LONDON, E.C.

ADVANTAGES OF GAS FOR COOKING AND HEATING,

BY

MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas-consumers.
Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

SLIDE-VALVES.

FOR SALE—14 12-in. and 5 10-in. Slide-VALVES with outside racks. They have been thoroughly re-fitted, and are equal to new. A low price will be accepted to effect a clearance.

Apply to JAMES WATSON, Engineer and Manager, Crystal Palace District Gas Company, LOWER SYDENHAM, S.E.

PIPES.—A large stock of 3-in., 4-in., 6-in., and 8-in. Cast-Iron SOCKET and SPIGOT PIPES (usual weights) ready for immediate delivery, either f.o.b. or ex ship or steamer in the Thames.

Address the MANAGER, Milton Iron-Works, WEST HARTLEPOOL.

TO GAS ENGINEERS.

THE Directors of the Sheffield United Gaslight Company require the entire services of a RESIDENT ENGINEER.

The requisite qualifications are a thorough practical knowledge of Engineering, preparation of plans and construction of works, the manufacture and distribution of gas, and of chemistry as applied to its manufacture and purification.

Applications to be addressed to the Chairman of the Company, stating qualifications, age, salary required, references, &c. Testimonials in the first instance are not necessary.

GAS TAR AND AMMONIA WATER.

THE Chorley Commissioners invite TENDERS for the GAS TAR and AMMONIA WATER made at the Chorley Gas-Works, for One, Two, or Three years, which will be delivered at the works.

Further particulars may be obtained on application to Mr. Thomas Hamer, Manager.

Tenders, endorsed "Tender for Gas Tar, &c.," will be received by the undersigned up to Saturday, Aug. 1.

The Commissioners will not be bound to accept the highest or any tender. By order,

RICHARD JACKSON, Solicitor,
Clerk to the Chorley Commissioners.

Chorley, June 26, 1874.

BRITON FERRY GAS-WORKS.

TO IRON FOUNDERS AND GAS APPARATUS MANUFACTURERS.

THE Gas Committee of the Briton Ferry Local Board of Health solicit TENDERS for the supply, delivery, and fixing, at their Gas-Works, Briton Ferry, of the undermentioned GAS APPARATUS :—

Six 15-in. diameter round retort mouthpieces complete, with 12 wrought-iron lids, cross-bars, screws, and lugs.
Six 6-in. equal ascension-pipes.
Six 6-in. arch-pipes.
Six 6-in. dip-pipes.
Two 6-ft. 3-in. lengths of 20-in. by 17-in. box-shape hydraulic main.
One vertical condenser, with 6-in. connexions.
One 3-ft. 6-in. diameter by 18 ft. high combined washer and scrubber, with 6-in. connexions.
One 6-in. "dry" centre-valve.
Four dry lime purifiers, 6 ft. by 6 ft. by 3 ft. 6 in., with wrought-iron plate covers, wood grids, lifting apparatus for covers, and 6-in. "dry" centre-valve, together with sundry 6-in. pipe connexions.

Copies of the specification, with conditions of contract and form of tender, may be obtained on application to Mr. John Lees Cocker, Gas-Works, Merthyr Tydfil.

Sealed tenders, endorsed, "Tender for Gas Apparatus," and addressed to the Chairman of the Gas Committee of the Local Board of Health, Briton Ferry, to be forwarded under cover to the undersigned, on or before the 18th day of July next.

Neither the lowest nor any tender necessarily accepted.

By order,
HENRY WILLIAMS, Clerk to the said Board.
Briton Ferry, near Neath, Glamorganshire,
June 27, 1874.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 49, Parliament Street, WESTMINSTER.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
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By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

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CANNEL.

THE West Yorkshire Iron and Coal Company, Limited, will be glad to receive FORMS for TENDERS from Gas Companies and others requiring a supply of CANNEL.

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WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CONTRACT FOR COAL.

THE Directors of this Company are prepared to receive TENDERS for about 10,000 tons of GAS COAL.

Particulars and conditions of tender to be obtained on application to the SECRETARY at the works.

Tenders to be sent in by the 20th of July inst.

North Street, Wandsworth, July 7, 1874.

WINDSOR ROYAL GASLIGHT COMPANY.

THE Directors of this Company invite TENDERS for the supply of 3150 Tons of GAS COAL (Unscreened), to be delivered free at the Windsor station of the Great Western Railway, such Coals to be either of the following descriptions—viz., New Pelton, Wearmouth, Holmside, Burnhope, Pelaw Main, or Ravensworth Pelaw.

The Contractor to state for which Coals he tenders, as none others than those specified in the tender will be received.

The Coals to be delivered as follows—viz., 450 tons per month, September, 1874, to March, 1875, both inclusive.

The Company undertake unloading of the trucks.

Tenders to be forwarded to me, marked "Tender for Coals," on or before the 1st day of August next.

The Directors will not entertain any conditional tender, or be bound to accept the lowest or any tender.

GEO. CARTLAND, Secretary.

Gas-Works, Windsor.

TENDERS FOR GAS COAL.

THE Walsall Improvement Commis-sioners invite TENDERS for the supply of 12,000 tons of Staveley, Yorkshire, or any other good GAS COAL, which may be delivered either at Walsall Railway Station, or by boat at Walsall Gas-Works; in the latter case it will also have to be unloaded and stacked in the coal-shed or such other place at the Gas-Works as may be directed. The Coal will have to be delivered at the rate of from 150 to 400 tons per week, as the Commissioners may from time to time require.

The weight, if delivered by rail, must be 2352 lbs. to the ton, if by boat it must be 22 cwt. to the ton, boat gauge. Payments monthly.

The Commissioners do not bind themselves to accept any tender, and they reserve the right to divide the contract between several firms.

Tenders, sealed and marked outside "Tender for Gas Coal," and stating the price for large Coal and also for Nuts, are to be sent to the undersigned on or before Thursday, the 30th inst.

SAMUEL WILKINSON, Commissioners Clerk.
Bridge Street, Walsall, July 6, 1874.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

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MANUFACTURE AND DISTRIBU-TION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

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ROOFS, GIRDERS, CONDENSERS,
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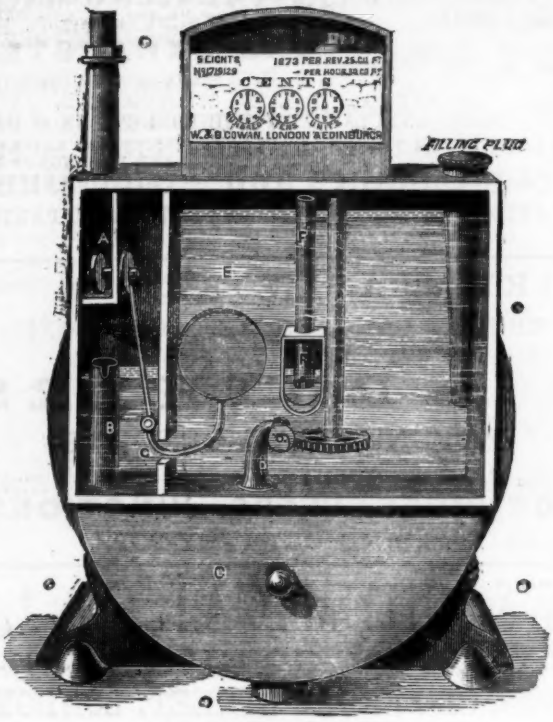
IN TIN CASE, PATENT SIDE VALVE ARRANGEMENT.



DESCRIPTION.

The gas passes from the valve-box A by the overflow-pipe B into the waste water box C, and upwards through the spout D to the measuring drum; E is the compensating fountain, in which also is the float, the lever of which, passing through the hole G, opens and shuts the valve.

When the water level in the meter lowers, the *bottom end* of the air or gas tube F becomes unsealed, thereby admitting air or gas into the upper part of the fountain, which, causing water to pass through the hole G, restores the level in the meter, when this action ceases.

The float and valve are beyond the influence of either inlet or outlet pressure, and the fountain is large enough for a year's supply.

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1862.

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TESTIMONIAL.

Alton Gas and Coke Company, Alton, Hants, April 25, 1874.

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I am, gentlemen, your obedient servant,

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Models may be seen, and information obtained, at the Offices, 28, Gracechurch Street.

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Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

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To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

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The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, your faithfully, MAGNUS OHREN.

GAS COOKING STOVES

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Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 30s., complete with Pan and Gridiron.

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BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

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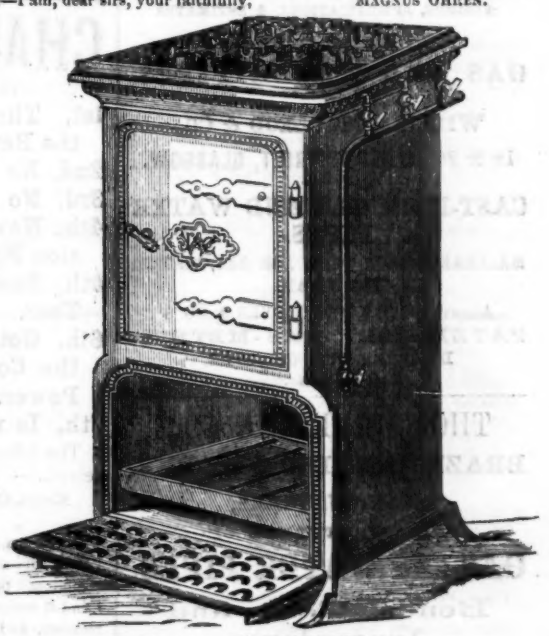

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MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
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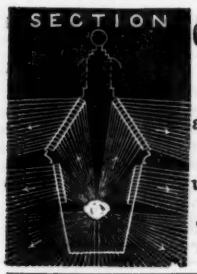

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T. A. SKELTON, 37, Essex St., Strand, LONDON,
INVENTOR AND PATENTEE.

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MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS.
DELIVERY F.O.B. ON CLYDE.
Lists on application.

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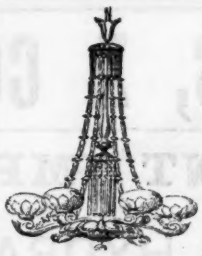
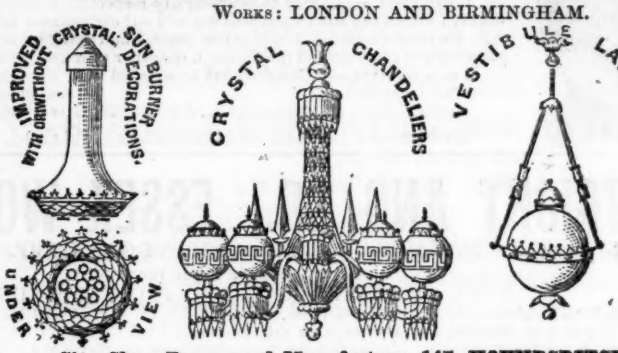
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.



F. & C. OSLER,
45, OXFORD STREET, LONDON, W.
MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.
ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

TO GAS COMPANIES AND THE TRADE.
J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
WORKS: LONDON AND BIRMINGHAM.



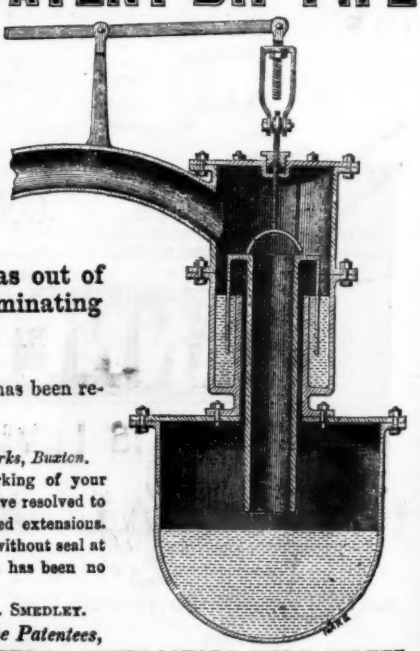
GAS MOONS,
Cut and Engraved, of the newest designs;
GAS REFLECTORS
In Silver and Glass;
GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.

City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

CHANDLER'S PATENT DIP-PIPE

The advantages are—
1st, There is no pressure on the Retorts.
2nd, No deposit of Carbon.
3rd, No scurfing required.
4th, Never a choked Ascension Pipe.
5th, Saves Fuel and Wear and Tear.
6th, Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7th, Is never out of order.



The following (among other letters) has been received:—
Messrs. Chandler and Sons.
Manager's Office, Gas-Works, Buxton.
Gentlemen,—I am so satisfied with the working of your Patent Dips during the last five months that I have resolved to recommend the adoption of them in our proposed extensions. I find it under perfect control to work with or without seal at pleasure, and that during the whole time there has been no deposit of carbon.—Yours, &c.,
Jan. 21, 1874. GEO. SMEDLEY.
For terms of use and cost, apply only to the Patentees,
Messrs. CHANDLER & SONS, ENGINEERS & CONTRACTORS, YORK STREET, LONDON ROAD, SOUTHWARK, LONDON, S.E.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

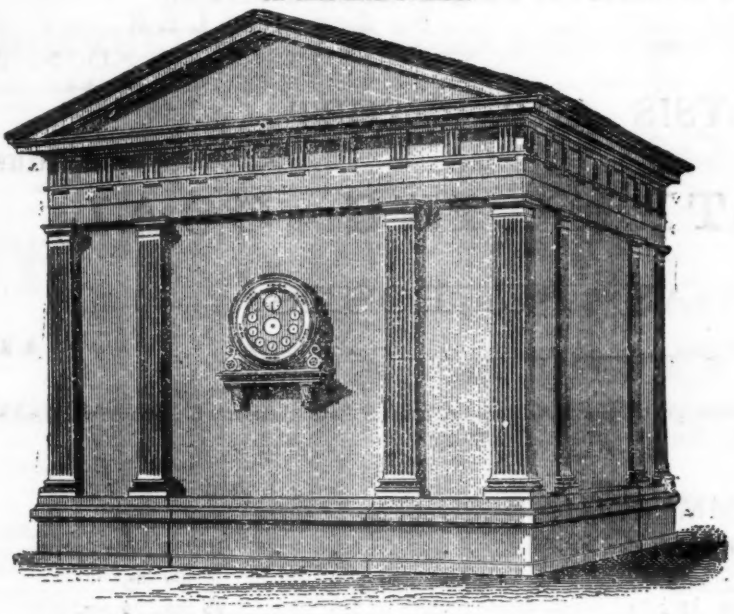
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

WATER-METERS SUITABLE FOR ALL PRESSURES.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

CANNEL COAL.

ELLIS LEVER & CO.,

GAS COAL MERCHANTS,

107, PICCADILLY, MANCHESTER.

ALL CLASSES OF

ENGLISH, SCOTCH & WELSH CANNEL COALS.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

THE

HUCKNALL COLLIERY COMPANY

Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.

Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

THE

WIGAN COAL & IRON COMPANY,

LIMITED,

COLLIERY PROPRIETORS,

(Head Offices: WIGAN, LANCASHIRE;

District Office: 18, BENNETT'S HILL, NEW STREET, BIRMINGHAM,)

Supply the Best Wigan Arley Mine Gas Coal and Nuts; the Best Hand-picked Round Cannel;

ALSO SMALL OR GAS CANNEL, &c., &c.

THE MIDLAND COAL COMPANY

Are prepared to enter into CONTRACTS with

CORPORATIONS & GAS COMPANIES

FOR SUPPLIES OF

GAS COAL & CANNEL.

Prices, Analysis, and other information on application at the

MIDLAND COAL OFFICES,

118a, OXFORD STREET, MANCHESTER.

EVERY DESCRIPTION

OF

GAS COAL AND CANNEL

SUPPLIED BY

E. FOSTER & CO.,

COAL and CANNEL

MERCHANTS,

21, JOHN STREET, ADELPHI,

LONDON, W.C.

Prices Quoted on application.

LEE and JERDEIN,

COAL OWNERS & MERCHANTS.

Chief Office:

9, LANCASTER PLACE, STRAND, LONDON, W.C.

SOLE VENDORS FOR

LONDON & THE SOUTHERN COUNTIES

OF

WIGAN COAL AND CANNEL,

From the Mines of the

INCE HALL COAL & CANNEL COMPANY, Limited,

AND

Messrs. W. H. BRANCKER & Co.

WILSONTOWN GAS COAL.

This Coal bears a close resemblance to the Lesmahago seam. It has a first-class Coke, equal to the Lesmahago, and greater in quantity, and 10,538 Cubic Feet of 33·2 Candle Gas.

For rail in Scotland, or shipped at Glasgow, Leith, or Granton.

ANALYSIS AND REPORT

ON

CLIMPY TRIPPING COAL,

FOR GAS PURPOSES.

THE results of this analysis, as shown below, were got from actual working, and we have therefore the utmost confidence in placing it, along with that annexed, before you.

COMMERCIAL RESULTS.

Gas per ton of Coal—temperature 60°—barometer 30 inches	10,200 cubic feet.
Coke per ton of Coal	1,400 lbs.
Durability of one cubic foot of the gas, by jet of 5-inch flame	48 min. 24 sec.
Illuminating power in standard candles	14·9

REMARKS.

Being well acquainted with Durham and Northumberland Coals, I have no hesitation in saying that "CLIMPY TRIPPING" is superior to any (containing, besides, a greater proportion of pieces from 7 to 14 lbs. weight), with far less impurities for purification, more gas, and coke equal in calorific power. It has a large mixture of cannel nuts, which accounts for the good quality of the gas, at our photometer in town, 1000 yards from the works.

It is also a very superior Coal for mixing with oils, as by Mackenzie's patent; or with acid tar, or tar oil, shale grease, or other refuse from paraffin-works, as by system of Mr. Scott, of Musselburgh, or Mr. Foster, Portobello, the Coal being easily crushed.

Below are the results realized by myself, when mixed with acid tar from paraffin work, received by me in a solid state, having been run on to very fine dross. My charges were 2 cwt. tripping and 28 lbs. of acid tar, each retort, running six hours; with lighter charges I get more gas, but not so good quality, or so much coke.

Gas per ton of Coal	10,800 cubic feet.
Coke per ton of Coal	1,540 lbs.
Durability of one cubic foot of gas, by jet of 5-inch flame	58 min. 28 sec.
Illuminating power in standard candles	27·29

The first truck received being tried with very light charges (unmixed), and running five hours, I got 10,500 cubic feet of 14-candle gas; and I am confident, practical managers, with good retort-fittings (mine being very inferior), and exhausters at work, as I have seen generally at home and abroad, will take 11,000 feet of 13-candle gas from it. My retorts are 8 feet × 2 feet × 14 inches, D shape, heavy dip, and no exhauster.

These remarks of mine you may perhaps think rather lengthy, but they will be the more intelligible to any manager inquiring for Climpy Tripping.

L. MONK,
Engineer and Manager.

Lanark Gas-Works, April 20, 1874.

GRAY AND PAUL,

WILSONTOWN GAS COAL WORKS & CLIMPY COLLIERY,

BY CARNWATH, N.B.

G. J. EVESON,

GAS COAL MERCHANT,

STOURBRIDGE.

Delivery per Rail to any Part.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 3 per cent. of ash.

MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL
Yields 12,550 cubic feet of 33-candle gas per ton.
Prices and full Analyses on application.

ALBERT GAS COAL.

THE DERBYSHIRE
SILKSTONE COAL COMPANY,
LIMITED,
CAN OFFER A
GAS COAL
Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
Weight of coke in lbs. per ton of coal	1,465

ANALYSIS AND PRICES ON APPLICATION TO
Mr. EDMUND TAYLOR, Secretary,
ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

DUKINFIELD CANNEL COAL.

THE DUNKIRK COAL COMPANY.

OFFICES:

ASTLEY DEEP PIT, DUKINFIELD.

ANALYSIS, PRICES, AND OTHER INFORMATION, ON APPLICATION AT THE ABOVE OFFICES.

MESSRS. NEWTON, CHAMBERS, & CO.,
THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
NEW YORK, 1853
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865
PARIS, 1867.

THE GAS-METER COMPANY, LIMITED,
238, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT & CO.,
MANUFACTURERS OF
"WET" & "DRY" GAS-METERS
of the highest excellence.
STATION-METERS AND GOVERNORS.
STREET-LAMP REGULATORS.
TESTING APPARATUS
of the most perfect description for all purposes relating to Gas.

NOW READY.
"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E.
Third Edition, cloth boards, 2s.; per post, 2s. 2d.

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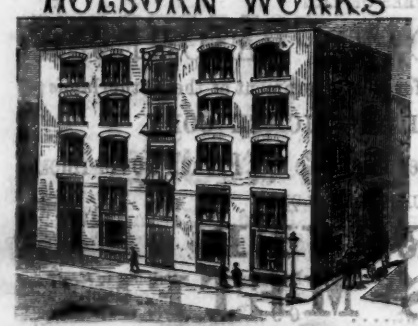
R. LAIDLAW AND SON,
EDINBURGH AND GLASGOW.
Manufacturers of
CONSUMERS IMPROVED WET GAS-METERS,
THE UNVARYING WATER-LINE GAS-METERS,
IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;
STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;
Experimental Meters, Photometers, Pressure-Gauges,
Governors, Test Holders, &c., &c.
LONDON OFFICE: 106, CANNON STREET, E.C.

"HOLBORN WORKS"



BILLING & CO.,
MANUFACTURERS OF THE
"REFLECTOR"
GAS COOKING STOVES,
THE "CHEERFUL"
GAS HEATING STOVES,
SUN BURNERS,
AND
GAS FIRES.

BILLING & CO.,
90, HATTON GARDEN, LONDON, E.C.
MANUFACTORY: HOLBORN WORKS, SMART'S BUILDINGS,
HIGH HOLBORN, LONDON, W.C.

SMALL GAS COOKING STOVE, No. 133, 12 in. wide. £1 15s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 14, 1874.